Universidade do Minho
Escola de Economia e Gestão

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TO PRESERVE OR NOT TO PRESERVE THE NATURAL AREA? A VALUATION STUDY APPLIED TO PHU QUOC ISLAND, VIETNAM

Abril de 2012

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Trabalho realizado sob a orientação da
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ABSTRACT

The study focuses on the common trade-offs between nature conservation and economic development, tourism in particular, in the case of Phu Quoc island, Vietnam; this is a problem poor and developing countries are often faced with due to severe budget constraints. Applying methods of economic valuation to non-market goods, the island environmental values are estimated as the direct use for recreational purposes and the indirect use for improving environmental condition. The field data was collected simultaneously through the administration method of a questionnaire online and on-site to tourists while a different questionnaire was applied through face to face interviews to local residents. The travel cost method reveals that the recreational value is equal to over 63 million dollars per year. The contingent valuation outputs the total annual economic values of nature conservation at nearly 1 million dollars to tourists and also reveals that tourists aren't willing to pay to improve the environmental program in Phu Quoc island. The result confirms the importance of nature as a recreational asset and explores the possibility for local authorities to apply market-based instruments through an environmental tax or a nature conservation fee to different subjects to promote the development of the area while protecting the natural environment.

Keywords: nature conservation, tourism development, travel cost method, contingent valuation method, Phu Quoc island, Vietnam.

RESUMO

Este trabalho estuda o compromisso entre conservação da natureza e desenvolvimento económico, em particular pelo turismo, no caso da ilha de Phu Quoc no Vietname. Este é um problema com que países pobres e em desenvolvimento se deparam frequentemente devido a fortes restrições orçamentais. Aplicando os métodos de valoração económica a bens que estão fora do mercado, os valores ambientais da ilha são estimados a partir do valor de uso directo para fins recreativos e valor de uso indirecto associado à melhoria das condições ambientais. Os dados de campo foram recolhidos simultaneamente através de um questionário pela internet e localmente junto dos turistas, enquanto um questionário diferente foi aplicado através de entrevistas pessoais a residentes locais. O método do custo de transporte revelou que o valor recreativo ascende a mais de 63 milhões de dolares por ano. A valoração contingente calcula um valor económico total anual da conservação da natureza de cerca de 1 milhão de dólares para os turistas e revela que os turistas não estão dipostos a pagar para melhorar o programa ambiental da ilha de Phu Quoc. O resultado confirma a importância da natureza como valor recreativo e explora a possibilidade de as autoridades aplicarem instrumentos baseados no mercado através de um imposto ambiental ou taxa de conservação da natureza a diferentes sujeitos para promover o desenvolvimento da área à medida que vão protegendo o ambiente natural.

Palavras-chave: conservação da natureza, desenvolvimento do turismo, método do custo de transporte, método de valoração contingente, Phu Quoc, Vietnam.

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LIST OF ABBREVIATIONS

CBA	Cost benefit analysis
CE	Choice Experiments
CEA	Cost-effectiveness analysis
CPUE	Catch per Unit Effort
CV	Capacity of vessel
CVM	Contingent valuation method
CWA	Clean Water Act
DORNE	Division of Natural Resource and Environment
EEPSA	Economy and Environment Program for Southeast Asia
EPA	Environmental Protection Agency
GDP	Gross Domestic Product
IUCN	International Union for Conservation of Nature
MBIs	Market Based Instruments
MCA	Multi criteria analysis
MHPM	Hedonic Price Method
MPA	Marine Protected Area
NGOs,	Non-Governmental Organizations
NOAA	National Oceanic and Atmospheric Administration
PPC	Provincial People's Committee
RBA	Risk-benefit analysis
RUM	Random Utility Model
TCM	Travel Cost Method
U.S	United States
UNESCO	United Nations Educational, Scientific and Cultural Organization
WTP	Willingness - to - pay
WWF	World Wildlife Fund
ZTCM	Zonal Travel Cost Model

I. INTRODUCTION

1.1 Environmental value and the need for valuation

"To preserve or not to preserve the natural area?" is always the big question for any government, especially for poor and developing countries. Natural area always contains many invaluable environmental goods and services. They are habitats for wildlife, biodiversity, and materials for production, consumption or just a scenic view for people's recreation. Sometimes people recognize its value and take proper actions on nature conservation but sometime the value is hidden or undervalued or even disregarded.

In economic terms, the value of environmental goods and services is defined as the sum of what people would be willing to pay for it. It can be observed through the trade in market by its price, for example crops, timber, mineral, etc. In the perfect competitive market, the price of goods is obeyed the law of demand and supply. People can easily recognize its economic value by the price they paid to have it.

However, for goods and services that are not traded in markets, their economic value is not revealed directly by market observation. They are called non-market goods or services to distinguish from the above type – market goods. In some cases, authors refer to environmental goods as non-market goods. They are underestimated and the decisions regarding their use and stewardship may not accurately reflect their true value to society. People who are willing to sacrifice for those goods are often given a label as memberships in environmental advocacy groups or votes in local referenda for political purposes. It seems to be a moral duty for who attempts to put an economic value on non-market environmental goods. "Yet although the best things in life appear to be free, that does not mean they are without financial value" cited from The Economist (2009). It simply means that nobody asks beneficiaries to pay when, for example, watching a beautiful sunset over the hills. Since the value of non-market goods is hidden, their use is over exploited and the stewardship is disregarded. Normally, when making decisions on regional development, the government wants to directly increase the local GDP but with no regard to possible environmental values. For example, they may destroy an ecosystem by undertaking the conversion of the land to other purposes without awareness of the value to regional tourism or particular economic activities. The costs are unknown for now, but may appear eventually as the price of improving living conditions due to environmental degradation, or the price of decreasing its traditional products when their materials become rare. Therefore, valuation of non-market goods is the important action that we can do to help nature conservation by revealing its value.

Economic value can be decomposed into use and nonuse values, which is illustrated in figure 1. Use value is defined as the value derived from the actual use of goods or services including consumptive uses, such as hunting, fishing, and non-consumptive uses, such as hiking, bird-watching. Use values may be broken down further into the direct use value, the indirect use value, and the option value. Direct use value refers to the value derived from the direct use or interaction with ecosystem-based provisioning services: food, water; and some cultural services such as recreation. Indirect use value refers to the value derived from regulating services: climate control, waste assimilation, water quality; and supporting services: nutrient cycling. Option value refers to the value derived from the option to make use of a resource in the future.

In the contrast, nonuse values are values that are not associated with actual use. It's also referred to as "passive use" values and derived from benefits associated with a resource or ecosystem-based service. These values include existence value, sometimes referred to as intrinsic value, which is the value derived from knowing something exists; bequest value, which is the value derived from being able to pass something on to another generation; and altruism value, which is derived from giving something to somebody else. (Cummings & Harrison, 1995; Mendelsohn & Olmstead, 2009).

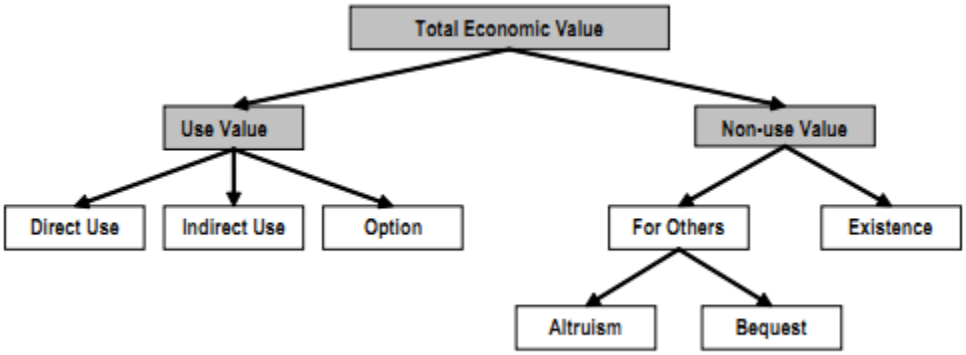

Figure 1: Total economic value (Pearce, Atkinson, & Mourato, 2006)

Environmental values depend on who is valuing them while the price of a market product depends on the market. For goods traded in world markets, everyone buys or sells at the world price, and marginal values are consistent across people. However, for goods that are not traded, values depend on the people affected. For example, the damage from natural resources such as coral reef in one country versus another will depend on the income of the country. People in a poor country have many critical needs to attend with their scarce resources and so may be unwilling to expend any money on natural resource conservation or

management. They may place a lower value or even a zero value on coral reef preservation than people in richer countries (Mendelsohn & Olmstead, 2009).

Environmental policy economists value non-market goods to understand what trade –offs are actually being made in policy. Many environmental goods and services are "public goods"; enjoyment of such goods by one person does not interfere with the ability of others to enjoy them and, most importantly, no one can be excluded from consuming public goods, whether they pay or not. Policy decision makers want to increase social welfare by comparing the benefits and costs through identifying policy interventions that generate net benefit. However, any policy also creates winners and losers, and winners must compensate the losers to bring losers back to their original level of well-being. In practice, the exact trade-offs are rarely know with precision.

Likewise, this study will analyze the trade-offs between nature conservation and tourism development in Phu Quoc island, Vietnam. The current situation of the island is described in section 1.3 in much detail. Environmental value in the study refers to direct value of recreation, hereafter referred as recreational value and indirect value to improve environmental condition, for instance, nature conservation, wastewater and solid waste. The thesis is composed of 5 chapters. This first chapter reviews the body of literature relevant to economic valuation and environmental goods in particular. It highlights the substantive findings of available studies in developing countries and also shows practices in Southeast Asia, Vietnam in particular. It also has a description of the socio-economic characteristics of Phu Quoc island, explains why this study is pursued and the objectives as well. Chapter 2 is dedicated to the methodology applied in the following chapter. Its content includes methods and valuation steps employed by the Travel cost method and Contingent valuation method. The following chapter describes the questionnaire and study design in detail. Chapter 4 analyzes the data and interprets results. Finally, chapter 5 concludes by emphasizing the findings and recommending the use of adequate market based instruments for government intervention.

1.2 Literature review of nonmarket goods valuation

Mendelsohn & Olmstead (2009) said that "There have been significant improvements over the past four decades to estimate the economic value of environmental goods and services for their amenities and dis-amenities". Economic valuation can be applied for many fields such as climate change impacts, damages from hazardous waste site, pollution or even ecosystem services including wetland, forest, species, and biodiversity. In the context of litigation, especially for the purpose of determining compensation, economic valuation methods are recognized as legal means of natural resource damage assessment. Besides the

policy context, economists value environmental goods and services in order to draw attention to the significant values of ecosystems to increase natural conservation; especially in poor and developing countries often facing the tough trade-offs due to severe budget constraints. This part highlights the scholarly works from the existing body of literature on environmental economic valuation in developing countries and in Southeast Asia in particular.

Since 1990s, in developing countries, there have been a number of studies of economic valuation on natural resources to reveal the significant value of ecosystem, for instance, tropical forest and coastal area where there are rich biodiversity and which are often damaged by human activities. Valuation tools such as Contingent valuation method and travel cost method are the most popular applications to value the willingness-to-pay by different subjects. Travel cost method focus on valuation of direct recreational use value from tourists only while Contingent valuation method can be applied to estimate total economic value for a variety of stakeholders.

Kramer and Munasinghe (1995) studied the change in environmental values resulting from the establishment of National Park in Madagascar. The establishment of a national park can create the gain and the loss for local society. If the residents are prohibited from extracting minor forest products, this may reduce their immediate income and local economics. However, , the park can offer enjoyment to tourists or even inhabitants, which may compensate the above mentioned loss with higher recreation or existence values. The study applied Contingent Valuation and Travel cost method to estimate environmental value for two different stakeholders: local villagers and foreign tourists. The annual recreational value is over 174 thousand dollars while the total economic value is up to 673 thousand dollars per year. The results show that tourism can be a significant source of benefits and the local government can apply market-based instruments, for instance, taxes, user fees... in order to finance conservation activities. The study also suggests that, with proper adaptation to local conditions, environmental valuation methodologies can be useful in assessing resource value changes in developing countries. A study such as this can therefore be useful as a means of instigating debate on the reallocation of costs and benefits.

Menkhaus & Lober (1996) determined the value that US tourists place on Monteverde Cloud Forest Biological Reserve in Costa Rica as ecotourism destinations. The authors used the Travel Cost Method as a non-market valuation approach to value the park. The survey was conducted by face to face interview to 240 USA tourists over a three month period. A demand curve was then estimated by evaluating the aggregate number of tourists who revealed by their travel expenditure (airfare to Costa Rica plus in country

expenditure) that they were willing to incur travel expenditure up to at least a certain amount in order to visit the park. The mean recreational value was estimated to be approximately 264 dollars per year and the total annual consumer plus is about 4.5 million dollars for the Monteverde Reserve to the entire US tourist population who visited Costa Rica's rainforests. This study explores that ecotourism is their sole reason for travelling to Costa Rica (leaving aside the issue of multi-purpose visits and attributing the travel expenditure to different activities) and recommend a new calculation for higher entrance fees which more accurately reflect the ecotourism benefit of the area.

The other study applied Contingent valuation is Hadker's study (1997) which estimated the Willingness-to-Pay on the part of residents of Bombay for the preservation of Borivli National Park, which is located within the city limits. The study arrives at a mean Willingness-to-Pay of 0.145 dollars per month per household[1]. This amounts to a total monthly value of 20 million dollars. The study shows that income, number of visits and a membership of an environmental organization are statistically significant factor to amount contributed to Protected Area. The authors also find out that group of businessman is likely to pay more and may be the main supporter to environmental improvements. One interesting thing from the study is that idea of volunteering in lieu of a monetary payment, which provides us a solution to distinguish between who are not willing-to-pay and who can't afford but are willing. The authors called for a further peer-reviewed study to create the funding for the National Park.

Some Southeast Asia countries, for instance, Philippine, Thailand and Vietnam have conducted several studies on environmental economic valuation in order to increase the public attention to protect scenery or biodiversity and create trusted funding for nature conservation; however, it is still scanty. Seenprachawong (2001) focuses on the economic valuation of coral reef in Phi Phi island, Thailand which is rich in coral reef ecosystems and is determined as an eco-tourism destination by government planners. The consumer surplus valued by the travel cost method reveals an annual value of 266 million dollars[2]. This study also applied the contingent valuation method to value both the use and non-use values of Phi Phi's coral reefs, representing an annual value of 644 million dollars[3]. It explored the potential annual budget for the island conservation. At that time, the economic benefits from coastal resource management in Phi Phi are mostly due to the local residents and businesses. The author suggested "tourists could be charged fees for

[1] Current exchange at 1 Rupee = 0.0194 USD (India Currency)
[2] Current exchange at 1 Bath = 0.032 USD (Thailand currency)
[3] Current exchange at 1 Peso = 0.032 USD (Philippine currency)

physically using the environment, such as participating in offshore water sports (specifically including snorkeling boats and dive operations), swimming and beach activities". The contingent valuation method valued the consumer's willingness to pay to increase biodiversity at Phi Phi as 9 dollars per visit. Based on this finding, the study recommended a basic entrance fee of 1.28 dollars per person per visit for Phi Phi and additional fee when tourists enjoy the more vulnerable recreational sites. The study also found the difference between other studies in the Southeast Asia that international visitors do not have a higher WTP than domestic visitors; therefore, the authors suggest no adoption of discriminatory pricing scheme to avoid an unnecessary psychological barrier for foreign tourists.

Subade (2005) and Nabangchang (2008) also applied the CVM to estimate the inhabitant's willingness-to-pay for nature conservation in three cities in Philippines and Bangkok, Thailand respectively. Both studies determines that the lack of funds have already been placing many of the main biodiversity areas in danger from illegal, destructive exploitation and aim to find alternative sources of finance for conservation program. The first study uses payment card technique to elicit information and outputs mean WTP value of 132, 77 and 158 dollars per year for Quezon, Cebu and Puerto Princesa city in Philippines respectively. While Nabangchang (2008) study shows that the majority of the Thai respondents would vote to pass a referendum to impose 8.1 dollars income tax surcharge (equally to 97dollars per year) through biding game elicitation to generate funds for conservation endangered species. Thus, people in Philippines tend to value nature preservation more than people in Thailand.

Economic valuation has been adopted in Vietnam for over a decade. International Union for Conservation of Nature (IUCN) and the organization Economy and Environment Program for Southeast Asia (EEPSA) have supported training and research in the field of environmental economics valuation. However, there are only two studies on the elicitation of the natural values. One is the valuable work of Pham and Tran (2001), which chose the case study on Hon Mun island in Nha Trang Bay, Khanh Hoa province to value the trade-off between port expansion and natural conservation. The study employs the travel cost method and the contingent valuation method to measure the recreational value and total economic value of the islands respectively. The zonal travel cost model (ZTCM) estimates the total annual recreational value of the islands for both subjects at approximately 17.9 million dollars and contingent valuation method shows the total WTP is 0.42 million dollars per year, while annual revenue from port expansion was only 3.1 million dollars. Thanks to this study, the port expansion proposal was cancelled to give play to formulate Marine Protected Area (MPA) and to develop ecotourism. One remarkable thing is that the authors

separated two group of subjects as domestic and foreigner tourist for both survey and data analysis. Foreigner tourists were recorded to support a significantly higher amount of individual consumer plus and mean WTP as well. The authors also applied their experience in field of CVM surveys to suggest that the biding game is not suitable for Vietnamese interviewees because they tend to answer the survey quickly and are likely to choose the first bid without looking forward carefully to the entire questionnaire. They suggested the use of the payment card instead.

Another study on a large-scale of demonstrated wetland sites valuation in Vietnam was carried out as support for environmental legislation. Mai et al. (2003) study is indeed a meta-collective work which attempted to value the total economic of 17 wetland sites in Vietnam including mangrove areas. A variety of methods are applied such as Environmental appraisal or environmental impact assessment, Cost-benefit analysis (CBA), Cost-effectiveness analysis (CEA), Multi criteria analysis (MCA) and Risk-benefit analysis (RBA). The results range from over 11 million VND/ha.year to 70 million VND/ha.year. However, at the time of study, the authors admitted that there was a conspicuous lack of comprehensive, detailed information of wetland valuation and called for further peer-reviewed researches on this field.

1.3 Phu Quoc Island

1.3.1 Location and topography

Phu Quoc Island is located in the Gulf of Thailand Phu Quoc islands at 9◦ 45' – 10◦ 30' N and 103◦ 55' – 104◦ 05' E in the South Western waters of Viet Nam. It belongs to Kien Giang Province and is the biggest island in Vietnam. It's close to Ha Tien town, around 46 km away. Phu Quoc is an archipelago, composed of 14 islands. The largest island, named Phu Quoc, covers an area of 567 km^2 and is about 50 km long north to south, between 3km wide in the south and 28km at its wide point, west to east, in the north. Phu Quoc is also called Emerald Island because of its triangular shape and emerald green seawater. The northern tip of Phu Quoc Island is 4 km to Cambodian coastline. The southern tip of Phu Quoc is in An Thoi islands, which consists of 13 smaller islands (Kien Giang Province, 2011b). The following figure shows the location of Phu Quoc island which was retrieved from website (http://thanhphohochiminhcity.jaovat.com)

Figure 2: Location of Phu Quoc island

Phu Quoc island is considered a priority site in the Biodiversity Action Plan approved by Viet Nam Prime Minister in 1995. Phu Quoc Nature Reserve was established in 1993 and then in 2001 changed to Phu Quoc National Park with more investment from the Government. National park is located in the north – east of the island. According to Kien Giang Province Website (2011c), Phu Quoc National Park covers 31,422 ha, accounting for 70% area of Phu Quoc Island. The island has a mix of continental and coastal climate that creates a diversity of ecosystem, for instance, primeval, secondary and indigo forests. Until now, 929 plant species have been recorded in the island. At lower elevations in some areas, Melaleuca, which is one kind of trees that the leaves are evergreen, alternately arranged dark green and grey-green in color, is found in the National Park. Besides, the fauna is also rich diversity, there are 43 mammal species belonging to 18 families and some of them are in the Red Book.

The Marine Protected Network plan, produced by the Ministry of Fisheries and submitted for the Prime Minister's approval, listed Phu Quoc as a key site in the network due to its significance in term of biodiversity, resource abundance and endangered species protection. The Phu Quoc Islands accompanied with U Minh Thuong Melaleuca forest, and Kien Luong mangroves has been proposed to be a Biosphere Reserve in the United Nations Educational, Scientific and Cultural Organization (UNESCO) network. The Phu Quoc Marine Protected Area (MPA) established in 2007 is characterized by large areas of coastal ecosystems and a sizable seagrass in northern island. Coral reefs occupy about 600ha, seagrass beds – more than 12,000ha and mangroves – 200ha. There are 125 species of fish, 132 species of mollusk and 62 species of sea weed. Phu Quoc is also one of the two places in Vietnam where the Dugong large marine mammal can be found (Nguyen X. N., 2005).

The Climate of Phu Quoc is equatorial, hot and damp with distinct dry and wet seasons. The dry season occurs from December to March while the wet season is from June to August. Mean annual temperature is 26 - 27o C. Annual mean rainfall amounts to 2,000 mm. Wind direction changes seasonally with monsoon regime (Kien Giang Hydro-meteorological Center, 2011). The figure-below presents Phu Quoc administration map which is got from Kien Giang province (2011a).

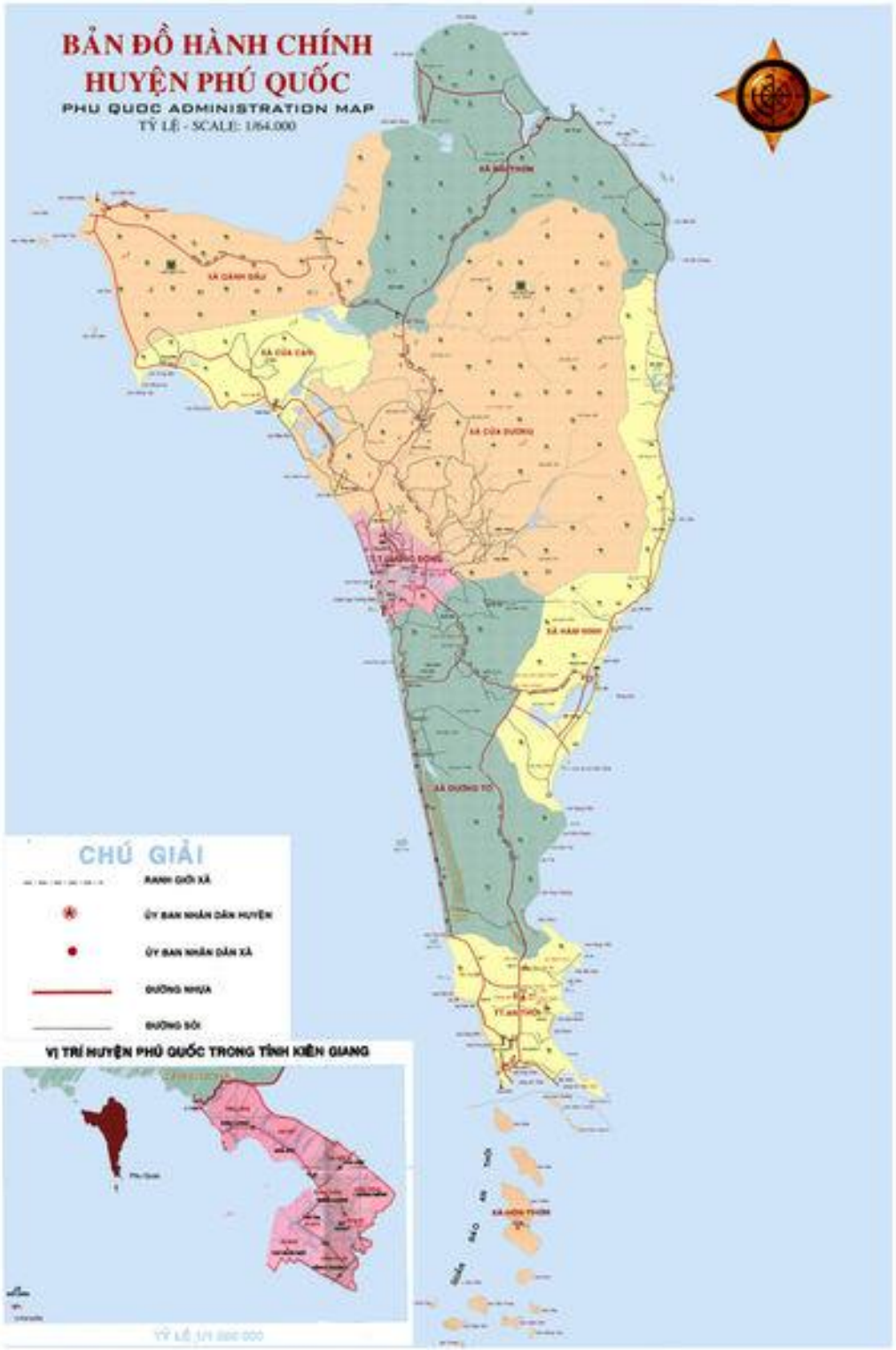

Figure 3: Phu Quoc administrative map

Phu Quoc has enormous potential and advantage for both economic development and tourism, in particular, giving the still well preserved nature its strategic position in Thailand Gulf, the proximity to international marine waterways and the ideal climate and rich biodiversity. It has also stored many invaluable species on the brick of extinction. Phu Quoc has a great challenge for simultaneous economic development and nature conservation. Next part presents the socio-economic characteristics of the island in detail.

1.3.2 Socio-economic characteristics

The population of Phu Quoc island inhabits the three main islands, Phu Quoc, Hon Thom and Hon Roi. The total population recorded in 2009 was 91.241 (Vietnam General Statistics, 2011), increasing 22,97% relative to 2001. Rich habitats and marine living resources in the waters support the area as "a biodiversity hot spot" in Viet Nam. Fishing is the main work of local residents, while the rest work in fish processing and other related occupations on the island. It is considered that fisheries and tourism play a very important role in the development of the district since they have provided jobs and benefits to the society. Many primary processing factories for marine products produce a variety of marine products.

Fish sauce "nuoc mam" is one example of a traditional product produced in Phu Quoc and exported to many different countries around the world. This is a traditional industry that turns low-value fish into a profitable product through a long period of fermentation and processing with salt.

Together with Nam Du and Tho Chu islands, some large fishing grounds are found in the area, the main ones being in the south of Phu Quoc. Many commercially important reef fish such as groupers, snappers, sweet lips, emperors, parrotfish and triggerfish are caught and there is a high demand for these fish in the market. Reef dwelling genera such as the groupers Epinephelus, Plectropomus, Cephalopholis, snappers Lutjanus, sweetlips Plectorhynchus, emperors Lethrinus and monocle breams Scolopsis have become the favored targets. Fishing grounds in seagrass beds provide high production of swimming crabs and Strombus shells (Nguyen X. N., 2005).

In the Master Plan of Phu Quoc island approved by the Government, tourism has been identified a key sector in development with plans for investment from different businesses. The activities of the project will address the issues concerned with national priorities in the islands and be the important external support for sustainable development of the island.

In the 1990s, there were only 8 accommodations on the main island, mostly concentrating in the west coast of Phu Quoc Island, but now this number increases 72, which include 1.489 rooms for up to 2000

people/day. The development of tourism in the area has provided more jobs and benefit to the local community. Tourism can be expected to play an increasingly important role in the development strategies of the island for the future. The number of tourists (mostly domestic) visiting the islands has increased dramatically during the last 7 years, from 74.997 people in 2001 and to 217.000 people in 2009, in which international tourists account for 53.000. The duration of stay of international visitors averaged 3 - 4 days per vacation per person while this value was higher, 3 - 5 days for domestic tourists. According to Vietnam General Statistics (2009) the total benefits to the district collected from tourism have increased from 11 billion VND in 2001 to 404 billion VND in 2009, which is nearly 20 million USD.

From new targets released by the Government in 2007 (The Prime Minister, 2007), Phu Quoc is aiming to attract 2-3 million tourist annually by 2020, with a larger portion of foreign tourists and to reach a profit of 771 million USD. Phu Quoc is blessed with favorable natural environment by rich biodiversity so it is not hard to see why the island has great tourist potential.

The Master plan orients the island to develop into a high quality eco-tourism destination by 2020. As investment has started to flow into Vietnam, the Island has been developing and improving infrastructure rapidly. The Prime Minister has issued new policy for the period between 2010 and 2020, which provides preferential investment opportunities both for domestic and foreign capital to develop an international standard tourism and trade center.

Phu Quoc international airport which was approved from 2008, covers 800ha in Duong To village, southern Phu Quoc island is under construction. It is scheduled to be in operation at the end of 2012 and replace the existing one. The airport can accommodate up to 7 million passengers per annum and link the island to major regional hubs such as Singapore, Thailand, China, Japan, Hong Kong, etc.

Figure 4: Phu Quoc tourist map

1.3.3 Threats to natural environment

Phu Quoc is changing day by day. A secret and sleepy island has been developed and transformed into a world-class tourism destination. It's dedicated to visitors with untouched virgin forests, white sandy beaches, emerald sea water and a diversity of terrestrial and aquatic species. However, today, the problems of biodiversity loss and irreplaceable scenery disappearance have appeared more and more, which result from the following economic consequences. The environmental concerns are recorded from several studies of South China Sea Project, in particular "Phu Quoc coral reef _demonstration site in Vietnam" from 2005 until now (Nguyen X. N., 2005).

Over exploitation

The main reasons that lead to decline in fish stocks and yields of the island are the increase of fishing boats and better fishing gear. Most fishermen complaint that their daily catch decreases year by year and they have to increase the number of fishing gear to get the same catch. According to the reports of Kien Giang Province (2006), the annual fishing yields has increased , however, catch per unit effort (CPUE) which is an indicator showing the fish abundance was reduced quickly, from average of 1.563 tones/CV in 1985 to 0.273 tones/CV in 2006 (5.7 times less). Nguyen X.N (2005) reported that large sized fish suffers most from exploitation relative to small fish. Fish with 1- 10 cm size represented more 90%, increasing 10% compared with that in 2000 (UNEP/GEF, 2008). The production of valuable species in seagrass beds such as swimming crabs, Strombus snails, sea cucumbers, sea horses, are has gradually been reduced.

Illegal fishing

Trawling, which is not allowed near the shore as according to regulation of Vietnam, commonly occurs on seagrass beds and shallow water. This is recognized as the greatest sources to damage the seagrass habitats, for instance, young seagrass shoots, small juvenile fauna, and endangered species. Moreover, fishing using toxins and electricity are still recorded in the waters around Phu Quoc island.

Catching of endangered species

Fishermen in Phu Quoc still catch and trade endangered animals in trans-boundary waters, making endangered species such as dugong, sea turtles at risk of local extinction in the near future. Corals are also exploited for handicrafts and sold to tourists in Phu Quoc island.

Uncontrolled tourism

Tourism development contributes to the development process by providing jobs and improving living conditions for local habitants. Anchoring on coral reefs, water discharge from hotels and tourist boats and

sediments from construction have negative impacts on the marine environment and cause habitats damage.

Pollution

Littering, waste dumping, land clearing, road building, coastal construction and poor agricultural practices are considered factors that lead to pollution, increase soil erosion and sedimentation, and cause the degradation of seagrass beds and corals reef area in the trans-boundary waters. It is noted that waste from fishing boats, including oil discharge is a serious problems in fisheries piers in Phu Quoc archipelagos.

1.3. 4 Stakeholders involvement

Phu Quoc is an island district of Kien Giang Province. According to the administrative system in Vietnam, the People's Council is the top supervisory bodies in the island and represents the local authorities of the State. They do not govern directly but instead elect and oversee the People's Committees that acts as executive bodies and carries out local administrative duties. The People's Committee is supported by the professional bodies in performing the function of State management, for instance, Division of Natural Resource and Environment (DORNE), Division of Agriculture and Rural Development, Division of Trade and Tourism, Division of Fisheries and Division of Science and Technology. In which DORNE takes the highest responsibilities for environmental protection on the island.

Phu Quoc National Park is established in 1993 and becomes an important agency for resource and environment management in the district. Though there are only 32 staffs, it manages 31.422 ha of natural and planted forest. According to the meeting memorandum of project "Phu Quoc coral reef_demonstration site", they emphasized the important role of the Park for the project in particular and for nature conservation in common (Kien Giang Province, 2011c).

Local communities and business are also the major factors to influence the effectiveness of nature conservation. They relate strongly to the resources and environment on the islands and their economic activities cause numerous impacts on coastal ecosystems. There occurs more and more luxury hotel, resorts such as Sai Gon - Phu Quoc, Eden, Chen La but none of them have their own wastewater treatment. On the other hand, fishery is the dominant economic sector of Phu Quoc island and the inhabitants' life is adversely impacted by unsustainable use of the resources. It is very necessary to enhance the nature conservation to the stakeholders and have strict action to prevent damage to environment.

In respect of NGOs, WWF-Indochina has implemented activities of conservation awareness enhancement in the framework of national program on turtle conservation. The organization Wide Life at Risk with an office in Ho Chi Minh City is also support for activities of nature conservation in the islands. They have done a number of studies on island's biodiversity (Nguyen X. N., 2005).

1.4 Study's significance and objective

Phu Quoc today has both opportunities and challenges inside. It has great opportunities to become a tourist world - class destination walking abreast with Bali, Phuket and other destinations in South Asia. Stunning beaches with white sandy, emerald sea water, long coconut rows always please all people even choosy tourists. In the process of transition, Phu Quoc is facing a lot of challenges as pollution, irreplaceable scenery disappearance and threats to biodiversity and other social issues emerge. However the current economic development doesn't correspond with the infrastructure and the concern for nature conservation. A trade-off between natural environment conservation and regional development is a major problem for the local authority. How much development is best for the regional economies to maximize the social benefit, and on the other hand still protect natural environment for sustainable development? When the value of environment is concealed, the trade-offs get tougher. Understanding the situation, this dissertation wants to bring out the best choice to government toward sustainable development.

The first aim of this dissertation is to value the island environmental goods and services which are non-market goods. Phu Quoc has rich biodiversity for both terrestrial and marine ecosystem. The island is also the habitat for many species on brick of extinction. However, the burgeoning tourism has increases the amount of uncollected waste and threats to local fauna and flora. Once biodiversity loss occurs, Phu Quoc not only loses its attraction to tourists but also decreases the living standard of local residents. When the value of environment is estimated and revealed, tourists, local authorities and inhabitants will recognize its important role and have a better attitude.

Secondly, once the environmental value is known, the benefit of tourism development can be balanced against the cost of nature conservation. (Freeman III, 2003, p. 1) stated that "We live in a world of scarcity and thus, we must make choices about how to manage the human impact on natural system. Greater use of a particular environmental service or greater protection of a specific natural system results in less of something else. This is the trade-off that we must accept. To make the most of scarce resources, we must compare what is gained from an activity with what is sacrificed by undertaking that activity''. The value of environment will give us a fairly comprehensive understanding toward a sustainable development. It also

brings an answer to government to decide how much development is best for the regional economy while ensuring environmental preservation for further generation. Finally, based on the findings, the dissertation shall suggest some recommendations to solve the paradox of natural conservation and tourism development. Market based instruments (MBIs) can be an adequate tool, which helps the government intervention achieve high effectiveness.

The methodology is presented in next chapter in detail. It talks about the valuation method for non-market goods in common and then the theory of travel cost and contingent valuation method. The chapter also discusses about valuation steps for each method thoroughly in theory part.

II. METHODOLOGY

2.1. Valuation method for non-market goods

Revealed preference methods are based on actual behavior reflecting utility maximization. In most instances, the environmental goods and services don't have a price, but sometimes its quantity does affect the choices people make about other things such as quantities of market goods. In these cases, the value of the environmental goods and services can be inferred through the observation of market behavior. Revealed preference models are based on the assumption of some kind of substitute or complementary goods. Bockstael & Freeman III (2002, p. 538) described that "revealed preference methods involve a kind of detective work in which clues about the values individuals place on environmental services are pieced together from the evidence that people leave behind as they respond to prices and other economic signals". If there are absences of clearly defined markets, the value of non-market goods can be derived from information acquired through surrogate markets. The most common markets used as surrogates are those for property and labor. The surrogate market methods are the Hedonic Price method (HPM) and the Travel Cost method (TCM).

An alternative group of methods are stated preference method which seeks to measure individuals' value for environmental goods directly, by asking them to state their preferences for the environment goods through an hypothetical market. Bockstael & Freeman III (2002, p. 43) stated that "The principal difference between revealed preference and stated preference methods is that the latter draw their data from people's responses to hypothetical questions rather than from observations of real-world choices". Stated preference questions of this type simply ask people what value they place on a specified change in an environmental amenity or the maximum amount they would be willing to pay to have an event occur. The responses, if truthful, are direct expressions of value and would be interpreted as measures of compensating variation. The term CVM is conventionally used to refer to approaches based on this form of questioning. Many scholars have studied the forms of stated preference question and each particular form has its own strengths and weaknesses. The two most important application of this method are the CVM and Choice Experiments (CE).

The dissertation applies both TCM and CVM method to estimate the environmental value of Phu Quoc island. TCM is used to measure recreational value through tourists who have been to Phu Quoc island for leisure while CVM is apply to elicit use, non – use and option value through both tourists who have experience or lack experience visiting Phu Quoc island. I also intended to apply CVM to value inhabitants'

WTP for environmental condition improvement, however for reasons later discussed in detail I managed to collect only a small number of observations. I will focus on the details of these two methodologies in the next subchapter.

2.2. Methodology

2.2.1. Travel cost method

TCM is an indirect valuation method that aims at estimating the value of a site, such as national park, wilderness area, beaches, island, amongst others for recreational purposes through the observation of the number of visits to the site. The TCM was initially proposed by economist Harold Hotelling (1947) in a letter to U.S Park service and subsequently developed by early studies of Jack Clawson and Marion Knetsch (1966). The method is based on the premise that the recreational benefits at a specific site can be derived from the demand function estimated through observed users' behavior, which was represented by the number of trips to the site and the cost of a visit.

According to Phaneuf and Smith (2002) the literature of travel cost method has gone through three stages. The first stage was created by works of Clawson (1959); Trice and Wood's (1958) .These studies showed that TCM can be divided into two applications: single-site and multiple-site. The second stage is that the opportunity cost of time, the role of substitute sites had been taken into account. The study of Burt and Brewer (1971) is representative for this stage. Finally, the subsequent publications of Hanemann (1978, 1984, 1985) introduce the random utility model as a theoretically consistent method for resolving the mixed discrete/continuous choice problem. However, the transformation would not have occurred without an unpublished Environmental Protection Agency (EPA) report by Bockstael, Hanemann and Strand (1987) that bridged the early work developed from a demand orientation to the new random utility model (RUM) and mixed discrete/continuous perspective on consumer choice.

Single-site models are useful for estimating the total use or "access value" of a site. It is also possible to use a single-site model to estimate the value associated with a change in the cost of access to a site. Some applications for this model are such as a scenic site closure due to an oil spill, reducing hunting for fishing, conservation purpose, or a development that eliminates a natural area for wildlife viewing. When the goal is to value changes in site characteristics at one or more sites or to value the access to more than one site simultaneously, a multiple-site model is preferred (Parsons, 2003). As the purpose of this dissertation is to estimate the value of a recreation site, I will apply the single-site model.

2.2.1.1 Theory of Travel cost and single site model

Single-site model is a demand model for trips of an individual to a particular site. The demand function is showed as the number of trips that an individual takes to the site, as a function of the trip's cost of reaching the site. However, trip costs alone may not explain an individual's demand for recreation trips. Demand will also depend on factors such as income, age, experience in the recreation activities available at the site, and proximity to other recreation sites. The single-site model can be represented by the following equation:

$$r = f(tc_r, tc_s, y, z) \quad (1)$$

(Parsons, 2003, p. 272)

In which:

r: number of trips

tc_r: trip cost including travel cost to this site and opportunity cost of time.

tc_s: cost of substitutive trip including travel cost and opportunity cost of time

y: income

z: demographic characteristics which influence the number of trips

A linear form of equation (1) can be written as:

$$r = \beta_{tc_r} tcr + \beta_{tc_s} tcs + \beta_y y + \beta_z z + u \quad (2)$$

Where β_i are the coefficients to be estimated, and u is the error term.

If an individual paid a trip cost of tc_r^0, he or she takes r^0trip.

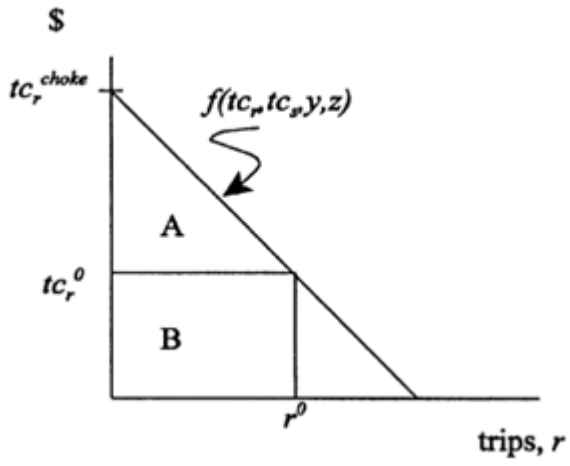

Figure 5: Access value in a Linear Single-site model

The area A is individual total consumer surplus for trips to the site. It is the difference between total willingness to pay for trips (area A+B) and total trip cost (area B). The area A is also called the individual's access value for the site and can be calculated mathematically by the following:

$$\mathbf{A} = \int_{tc_r^0}^{tc_r^{choke}} f(tc_r, tc_s, y, z)dtc_r \quad (3)$$

2.2.1.2 Steps in estimation by the Travel cost method

Travel cost method can be conducted in three main steps. It begins with the definition of the site to be studied and the choice of which recreational uses to be valued. Then, it focuses on constructing a survey to elicit tourists' information regarding their trip cost and socio-demographic characteristics. Finally, a suitable econometric model will be applied to the data collected to estimate recreational values. The details of three steps as they will be implemented in this dissertation are explained as follows:

Step 1: Define the site to be valued and recreational uses

Phu Quoc island is the site to be studied as referred above in Section 1.3. It not only includes the National Park in the North of the island but also the MPA where the coral reefs habitats are in the waters surrounding the An Thoi archipelago in the south of Phu Quoc island, and a sizable sea-grass habitat in the coastal waters in northern Phu Quoc island.

Its recreational uses include trekking, camping, swimming, snorkeling, diving, boating, fishing, etc. Tourists visiting Phu Quoc enjoy the striking beaches and virgin forest. The recreational uses can be grouped in two types: beach use, which can include sunbathing, swimming, surfing, jogging, etc. and forest use. These two uses are treated as two single recreation types for this study.

Step 2: Measuring trip costs

The basic premise of the travel cost method is that the trip expenses people incur to visit a site represent the "price" of access to the site. Thus, people' WTP to visit the site can be estimated based on the number of trips that people make at different travel costs. This is similar to estimating people' WTP for a market good based on the quantity demanded at different prices. Typical costs for a trip include: travel cost and time cost.

Travel cost must include all transit expenses. If it is a multi-destination trip, the travel cost for longest distance must be divided among the different destinations. And if travel costs are shared by several people, efforts are sometimes made to consider only a proportion of the costs. For example, the questionnaire is designed to ask directly for an individual's share of the cost.

The other type of cost which has received the most attention in the literature is estimating the time cost of the trip. Time lost traveling to and from the site and time spent on the site constitutes time that could have been devoted to other endeavors. The value of those lost opportunities is the time cost of the trip. Time cost often accounts for a sizable portion of the total trip cost and is related to a person's wage in some way.

The total trip costs are calculated as the sum of the travel costs and time costs. Time cost is considered as an opportunity cost, given that they are taking time away from work and other leisure activities to visit the Phu Quoc. In this study, time costs are evaluated at 1/3 of hourly wages for individuals, following Cesario's (1976) suggestion. An individual's hourly wages are determined by dividing household income, income, by 174 average hours per month of work (Berkeley, 2011).

The detail calculations for this study is presented as following equations

Time cost: $$\mathbf{wage30} = \frac{\mathbf{1}}{\mathbf{3}} \mathbf{x} \frac{\mathbf{y}}{\mathbf{174}} \quad (4)$$

In which: wage30 means 1/3 individual hourly salary, which presents time cost for this study

y: monthly salary

Total trips cost to Phu Quoc island, which accounted multi-destination and time cost

$$\mathbf{tcr} = \mathbf{travelcost} + \frac{\mathbf{multidesct}}{\mathbf{multidest}} + \mathbf{wage30} \quad (5)$$

In which: tcr: trips cost to Phu Quoc

travelcost: travelling expense to Phu Quoc only

multidesct: travel cost from home to the first destination and return in case of multi-destination trip.

multidest: number of destination in the trip

Travel cost to substitute site associated with time cost:

$$\mathbf{tcs} = \mathbf{travelcost2} + \mathbf{wage30} \quad (6)$$

In which: tcs: trips cost to substitute site

travelcost2: travelling expense to substitute site

Step 3: Estimating total economic value

Estimation of single site demand models begins with an assessment of the data generation process. Haab & McConnell (2002, p. 174) said that "The data is generated as count data and count data models are intuitively appealing for recreational demand because they deal with non-negative integer valued dependent

variables" The authors also mentioned "For recreation, the number of trips is a non-negative integer. The integer characteristic is less important than the non-negative range of the variable. The count model specifies the quantity demanded, trips, as a random non-negative integer, with a mean that is dependent on exogenous regressors." The appropriate models for this type of data are the Poisson and the negative binomial model. The difference between the two models occurs when the variance is greater than the mean, implying over dispersion in the data, if that is the case the Negative binomial is the most appropriate as the Poisson assumes equal dispersion. One consequence of over-dispersion is that the standard errors estimated in the Poisson model are underestimated, leading too frequently to the rejection of null hypotheses of no association. Negative binomial models are a more general form of a count data model than the Poisson model, where the assumption about the equality of the mean and variance is relaxed by incorporating an additional error term to account for systematic differences (Greene, 2008; Haab & McConnell, 2002). These models are typically applied to correct for over dispersion in data, where there may be a wide range of costs associated with a single trip frequency (Martinez-Espineira & Amoako-Tuffour, 2008) and latent heterogeneity in the dataset (Greene, 2008).

The probability of observing an individual take r trips in a season is

$$\mathbf{Pr}(\boldsymbol{r}) = \frac{\mathbf{exp}(-\boldsymbol{\lambda})\boldsymbol{\lambda}^{\prime}}{\boldsymbol{r}\,!} \tag{7}$$

The λ is the expected number of trips and is assumed to be a function of the variables specified in the demand model. To ensure nonnegative probabilities, λ, usually takes a log-linear form

$$\mathbf{ln}(\boldsymbol{\lambda}) = \boldsymbol{\beta}_{tc_r}\, \boldsymbol{tc_r} + \boldsymbol{\beta}_{tc_s}\, \boldsymbol{tc_s} + \boldsymbol{\beta}_{y}\, \boldsymbol{y} + \boldsymbol{\beta}_{z}\, \boldsymbol{z} + \boldsymbol{u} \tag{8}$$

The likelihood of observing the actual pattern of visits is the product of these probabilities

$$\boldsymbol{L} = \prod_{\boldsymbol{n=1}}^{\boldsymbol{N}} \frac{\mathbf{exp}(-\boldsymbol{\lambda_n})\boldsymbol{\lambda_n^{r_n}}}{\boldsymbol{r_n}\,!} \tag{9}$$

An individual is denoted by n = 1, ... N, so r_n is the number of trips taken by person n. In estimation, the parameters β, on which λ depends according to equation (8), are chosen to maximize L.

Consumer surplus, or access value, for each person in the sample (area A) has an explicit form in the Poisson model. For individual n the surplus is

$$\boldsymbol{A_n} = \frac{\boldsymbol{\lambda_n}}{\boldsymbol{\beta}_{tc_j}} \tag{10}$$

where λ_n is the expected number of trips from equation (5). Once the parameters of the model are estimated, equation (7) is used to calculate the surplus value for each individual in the sample and then aggregated over the population of users to arrive at a total access value.

The next subchapter presents the second method, Contingent valuation. It presents the theory and then steps of the estimation.

2.2.2. Contingent valuation method

Contingent Valuation Method was first used by Davis (1963a) in a study of deer hunters in Maine. After that, Ronald Ridker (1976) used the CVM to value the benefits of abatement of air pollution from power plant and mine shaft. This study was notable because of the use of photographs to show visibility levels for each hypothetical market. The elicitation question used was a bidding game (a series of alternative WTP values are proposed to the subject in an interactive manner, increasing if subjects' answer to previous amount was a yes and decreasing otherwise). Since the early 1970's the CVM technique has been recognized as a method to ascertain the value of non-market goods and it first came into the public spotlight in a significant way with the Exxon Valdez oil spill in 1989.

In order to answer the skeptical question whether the contingent valuation method capable of providing estimates of lost non-use or existence values that are reliable enough to be used in the natural resource damage assessment. In 1993, a panel of NOAA experts, with the Nobel Laureate Kenneth Arrow as the chairman, concluded that well conduct CVM studies can produce reliable estimates to be the starting point of a judicial process of damage assessment, including lost passive values. This conclusion cheered all researchers who wish to use the contingent valuation method. The Panel also qualified such a statement by establishing a set of guidelines, recommended to all future CVM applications, concerning the design and execution of the survey instrument (Arrow et al., 1993).

2.2.2.1 Theory of contingent valuation method

The theoretical model that provides the setting for this analysis was first articulated by Mäler (1974) and derived from welfare theory (Bockstael & Freeman III, 2002). An individual has preferences for goods denoted by x. Depending on the context these may be a single good, in which case x is a scalar, or several goods, in which case x is a vector. Individual preferences are represented by a utility function U(x).

The individual faces a set of given prices for these goods and chooses quantities of the goods so as to maximize utility given constraints of prices and fixed money income Y, that is:

$$\max U = U(x) \qquad subject\ to \qquad p_i x_i \leq Y \tag{11}$$

where X is a vector of n goods and services and P is a corresponding price vector, and Y is individual income.

The solution to this problem leads to a set of *n* ordinary or Marshallian demand functions:

$$\boldsymbol{x_i = x_i(P, Y)} \quad in\ which\ \ i = 1, \ldots\ldots, n \tag{12}$$

From (8) and (9), the indirect utility function expresses utility as a function of prices and income:

$$\boldsymbol{U = V(P, Y)} \tag{13}$$

The marginal welfare change for a change in Q can be derived by differentiating the indirect utility function and expressing the change in Y necessary to compensate (i.e., to keep utility constant) for the change in Q

$$\frac{\boldsymbol{dY}}{\boldsymbol{dQ}} = \frac{\boldsymbol{\partial V}/_{\boldsymbol{\partial Q}}}{\boldsymbol{\partial V}/_{\boldsymbol{\partial Y}}} \tag{14}$$

For non-marginal changes, the concepts of compensating and equivalent variation are used to measure welfare effects. The first expresses the amount of money that must be taken away from or given to an individual to make him as well off after the change in environmental quality as he was before it. Using the indirect utility function, compensating variation (CV) can be defined implicitly as:

$$\boldsymbol{V(P^1, Q^1, Y^1 - \ CV) = V(P^0, Q^0, Y^0)} \tag{15}$$

where the superscripts 0 and 1 denote initial and subsequent levels of the variables, respectively. CV is the amount of money that must be given to the individual (or taken away from him) in lieu of the environmental change in order to make him as well-off as he would have been with the change.

Equivalent variation (EV) is given by

$$\boldsymbol{V(P^1, Q^1, Y^1) = V(P^0, Q^0, Y^0 + EV)} \tag{16}$$

In case of no price changes, there are only changes in income. The CV and EV measures are defined implicitly by:

$$\boldsymbol{V(P^0, Q^0, Y^1 - CV) = V(P^0, Q^0, Y^0)} \tag{17}$$

and

$$\boldsymbol{V(P^0, Q^0, Y^1) = V(P^0, Q^0, Y^0 + EV)} \tag{18}$$

To develop the mechanism for measuring the compensating and equivalent variation associated with changes in prices and quantity (or quality), it is often useful to express these measures explicitly in terms of the expenditure function, derived from the dual to the utility maximization problem. Consider the case in which Q enters the utility function directly. The dual to the individual's utility maximization problem is:

$$\boldsymbol{Min\ PX \qquad subject\ to \qquad U(X, Q) \geq U^0} \tag{19}$$

Substitution of the cost minimizing demand for X into the objective function yields the expenditure function, which expresses the minimum amount of money necessary to achieve a specified utility level, given market prices and environmental quality,

$$\boldsymbol{e = e(P, Q, U^0)} \tag{20}$$

Compensating and equivalent variation of a change in P and Q can now be defined explicitly as:

$$\boldsymbol{CV = e(P^0, Q^0, U^0) - e(P^1, Q^1, U^0)} \tag{21}$$

And

$$\boldsymbol{EV = e(P^0, Q^0, U^1) - e(P^1, Q^1, U^1)} \tag{22}$$

In which:

$$\boldsymbol{U^1 = V(P^1, Q^1, Y)} \tag{23}$$

2.2.2.2 Steps in the estimation of a contingent valuation function

As Travel cost method, the application of the CVM can be divided into three main steps. It begins by setting up a hypothetical scenario. The main idea here is to construct a scenario which corresponds as closely as possible to a real-world situation. It is usually hypothetical for the persons being interviewed. Secondly, it is the design of questionnaire and survey to obtain the data. A limited sample of the underlying population will be selected and let this sample go through an interview (or possibly a sequence of interview sessions). The interviews to elicit the information of "Willingness-to-pay" (WTP) can be in person, by email, by phone etc. Finally, a suitable econometrics model will be applied to the data collected to estimate non-market values. The details of the three steps are now explained.

Step 1: Setting up a hypothetical market and description of environmental services

Today, Phu Quoc islands has more widespread concerns through authorities from national to local level, experts and domestic, and foreign tourists as well. The island is developing to turn into a World class destination. A National Park was established in the northern island and it was also recognized as part of Kien Giang biosphere reserve in order to promote more natural protection. Though there are many efforts from the government, nature preservation is still hard work and need support from the beneficiaries, tourists and inhabitants in particular. Tourists favor Phu Quoc because of its biodiversity and peaceful environment; therefore, it is reasonable to ask a tourist the willingness to pay to contribute to the natural conservation and environmental condition improvements in order to enjoy such benefit for present and future visits.

Step 2: Questionnaire design

Haab and Mc.Connell (2002) mentioned that "It is worth stating the obvious: no amount of careful data handling and econometric analysis can overcome a poorly designed questionnaire". The essential and most important task of CV analysis is the design of questionnaire and survey procedure. The CV questionnaire begins with a convincing explanation of the scenario which composes the description of the environmental services or goods, and the context of the policy or proposed change in resource allocation that will be valued. A concrete scenario allows each respondent to understand what, exactly, they are paying for. The payment method or vehicle must be brought forward into the scenario. There are several payment methods applied in CVM study, for instance, environmental tax, fee, entrance fee and payment on utility bills. "Acceptable vehicles provide a clear link, one that implies the necessity of payment to receive the service " cited from Whitehead (2000).

There are several methods of asking CV questions to derive WTP responses (Alberini & Kahn, 2006). The simplest method is the open-ended question asking respondent directly how much he/she would be willing to pay. For example: "What is the maximum amount of money that you would be willing to pay for ....?' or "How much would you be willing to pay....?" It has major advantages that provide straightforward actual valuation of amenities and easy analysis. However, it is relatively difficult for respondents to answer and in some cases respondents may even skip the unfamiliar question entirely and quit the survey. Because the purpose of this research is the valuation of Phu Quoc's recreational uses for both domestic and foreign tourists, a closed-ended question will be used. The survey will be conducted online and on-site to collect a large enough sample to overcome possible non-responses.

An alternative to the open-ended question is the payment card question. The payment card question asks an open-ended question but provides value interval response to respondents. Respondents could be given the following response categories: 'Between $1 and $5', '$5 and $10', '$10 and $15', and 'More than $15'. Respondents would then indicate the response that most accurately reflects their maximum willingness to pay. A problem is that payment card questions are likely to present "range bias".

The bidding question is a kind of closed-ended question. It brings out a starting point then raises the value gradually. The question would continue until the respondent answered 'no'. If the respondent answered 'no' in the first place, they would be asked the question again with a lower value until the respondent answered 'yes'. Interviewee iterates up or down until the respondent's willingness to pay was narrowed

down to the value. The result was a continuous measure of willingness to pay obtained from relatively easy-to-answer questions that were more difficult to free ride on.

Unfortunately, bidding question is prone to starting point bias. If the starting point is a low value, the average willingness to pay amount ends up lower than if the starting point is a higher value. In Phu Quoc instance, biding game will not be suitable, as Vietnamese tend to choose the first bid that the interviewer proposes. In the economic valuation study of Hon Mun island, Pham and Tran (2001) had shared their experience in field of CVM surveys in Vietnam that " It is easier to get a more accurate result if a range of values is presented for them to choose from".

Arrow et al. (1993) recommended referendums type of design for CV surveys because by posing the elicitation question in form of referendum, CVM studies imply a certain imposition of the payment scheme (Mitchell & Carson, 1989). Most closed-ended question referendum are single or double referendums where individuals are presented with a bid and respond with yes/no binary decision (single-responses referendum) and where individuals are presented with a sequence of two payments to obtain binary decisions (double – response referendum).

Step 3: Estimating the WTP

The study separates the decision, between deciding to contribute and the amount contributed. Probit function is applied to determine tourists' decision.

$$\mathbf{y} = \mathbf{0} \quad \text{if } y^* \leq 0 \qquad (24)$$
$$= \mathbf{1} \quad \text{otherwise}$$

The WTP value is considered as censored variable because of its occurrence mainly at the minimum or maximum. Jöreskog (2002) mentioned that the bias of the variance does not become smaller even the sample size increases because the censored variable is not observed over its entire range ordinary estimates of the mean. The Tobit model overcomes these weaknesses.

Let y* be normal distributed with mean and variance. An observed variable y is censored below if

$$\mathbf{y} = \mathbf{0} \quad \text{if } y^* \leq 0 \qquad (25)$$
$$= \mathbf{y^*} \quad \text{otherwise}$$

The censored normal regression: $\mathbf{y^* = b_0 + b_1 + x + u}$ (26)

In which:

b_0 : constant

b_i: a vector of regression coefficients on explanatory variable x.

u: error term, assumed to be normally distribution with mean 0.

Though CVM is recognized as a reliable method to value environmental goods and services, it still contains potential biases which can led to systematic over or underestimate of true WTP value. One such bias, referred to as hypothetical bias, may arise precisely where the use of hypothetical scenarios may not convincingly replace the absence of real market transactions (i.e., people do not believe they would have to pay, or they ignore the cost to them). This is a major factor associated with 'incentive incompatibility' (an incentive compatible contingent valuation survey design is one that results in respondents providing truthful and accurate responses to the contingent valuation question). Operation and information is other type of bias where there is different understanding of the environmental goods and information provided on the hypothetical scenario might affect stated WTP respectively. It can be minimized through feedback from pre-tests survey. The payment mechanism can create bias due to there is available respondent's favorite payment method in questionnaire, they may 'protest' by not stating a WTP even if they would be in reality. Finally, there is strategic bias where the respondent purposely understates or overstates the bid value so as to influence the outcome of the survey (in hopes that it influences policy).

III. QUESTIONNAIRE AND SURVEY DESIGN

The island environmental value is estimated as the direct value of recreation and the indirect value to improve environmental condition, for instance, nature conservation, wastewater and solid waste. The survey is designed to focus on tourists and inhabitants as the two main subjects of the study. This chapter explains the design of questionnaire for the tourists and inhabitants. Then it explains the survey method applied to collect information for applications of the TCM and the CVM. Finally, it describes the survey in detail.

3.1 Questionnaire design

3.1.1 Tourist survey

The questionnaire is designed by combining the TCM and CVM to collect information from tourists. The information elicited about their recreational behavior, willingness to pay for environment and demographics. The questionnaire is composed of 4 parts: introduction, tourist behavior, willingness to pay and demographics (questionnaires are available in the appendix 2).

- **Introduction**

The introduction presents the respondent to the context of the survey: briefly it informs respondents that Phu Quoc was a secret and sleepy island, however, more and more signs of mass tourism have appeared and problems of environmental degradation are worsened. Then, it explains the purpose and the main task of the survey that is to determine the environmental value of Phu Quoc island by TCM and CVM. The introduction also lets respondents know that the survey will include questions about their socioeconomic information and perception of a hypothetical scenario. There is also a reference to the researcher's commitment to ensuring the complete confidentiality to all responses and finally people are thanked in advance for their participation. Respondents are advised that they will have an opportunity to leave comments by email to the author at the end of the survey.

- **Tourist behavior**

This part regards tourist's travel experience and focuses on their last (or current) trip to Phu Quoc island.

- **Trip count question**

The trip count questions ask the respondent to report the number of trips taken to the site over a designated time period. These questions may be divided by recreation type such as number of trekking trips, number of boating trips, and so forth. They are also designed to deal with multiple-and single-purpose trips. The single site model of TCM is fitted for single purpose trip, therefore, the question about

the purpose to Phu Quoc will eliminate other purposes except leisure. For multi-site trip, visiting a site may be a part of a round trip involving visits to other locations and the travel cost from the visitor's home to Vietnam for vacation represents a high percentage of their total cost. Therefore, a portion of the airline ticket form their home to Vietnam relating to the recreational site in question must be taken account. This survey will divide this cost into number of destinations in the tour then add it to the travel cost to Phu Quoc trip.

- **Last trip question**

The last trip questions pertain to the most recent trip taken by the respondent and include information such as time spent on-site, number of people, travel expenses, other expenses incurred, and information on the trip experience. These data are used to estimate trip cost and sometimes to create other explanatory variables in the demand model. These are gathered for the last trip only because gathering them for each trip over the season can lengthen a survey considerably and are difficult for respondents to recall for every trip.

The most important questions of last trip are trip cost and time cost. Once the raw data are assembled and organized, the trip costs to the site and any substitutes are computed. Trip cost is the sum of the expenses required to make a trip possible. Typical costs for trip include: travel cost, access fees, accommodation cost, time cost and entertainment cost. However, single site model focus on trip cost just including travelling cost and time cost only.

- **Willingness to pay**

This part includes questions about the respondent's perceptions of current environmental quality, how he or she feels about the proposed project, whether they would support the proposed project. The questionnaire is also designed to get information of their preferable payment vehicle to project if they agree to pay; otherwise, respondents are questioned about the reason behind their decision for not contribution.

The survey proposes fund-raising for two projects: natural conservation and environmental condition improvement. It begins with a short description of current context of the environment in Phu Quoc and presents a hypothetical scenario to solve problems. The study applies open-ended questions for both projects to ask about the amount which the tourist is willing to pay for the proposed project "How much would you be willing to pay... ". This elicitation method provides straightforward actual valuation of amenities. The payment mechanisms are entrance/exit fee and donation for both proposed projects and two extra options of payment with accommodation bill and with airline/ferry ticket for natural conservation

project. The reason for this discrimination is that it is unfair when applied two extra options for the tourist contributing to environmental improvement to a site where they didn't reach. The money collected would be managed by Board of Trustees from representatives from the People's Committee and the private sector. Last concern refers to revelation of the reason why the tourist wouldn't be willing to pay for the proposed project by linking the question "Why would you not vote for the program?" There are five possible reasons for that decision phrased as: "I can't afford", "I am satisfied with the current status", "it is the local government's responsibility", "I do not believe the money will be used for program" and "the information is not clear".

- **Demographics**

Demographic questions are about the respondent's characteristics and circumstances such as sex, age group, occupation, education, household type, income, religion. Demographic data helps to paint a more accurate picture of the observation, and how are these characteristics related to subjects' environmental preferences. Collection of this data makes it possible to check how similar the group of respondents is to the entire group being surveyed. By using statistical methods, it is possible to ascertain whether the group that responded to the survey is representative of the group whose attitudes the researcher is investigating.

Demographic questions also supply data to analyze the relationship between independent and dependent variables such income, age, education, sex, etc. and amount of willing to pay. It allows for comparing responses among different subsets of survey respondents. One notable example is the comparison of responses between high-income and low-income households within a given group. It also can be important for us to understand the relationships between certain demographic attributes (e.g., education) and willingness to pay. Demographic information is also crucial given that one of the major critiques of willingness to pay surveys is that making decisions based on the survey results biases the preferences of those who are able to pay more. Thus, demographic information can assist public decision-makers in compensating for any economic disparities among respondents (Raheem et al., 2009).

3.1.2 Local resident survey

The questionnaire is designed by applying only CVM to collect information towards local residents. Inhabitants are affected by environmental degradation directly, therefore it is important to understand what their perception and willingness to pay for the environment is. The questionnaire is composed of 4 parts: introduction, environmental attitudes and perception, willingness to pay and demographics. The

introduction and demographics parts are similar to the tourist questionnaire. This section just focuses on environmental attitudes and willingness to pay parts (questionnaires are available in the appendix 3).

Inhabitants' environmental attitudes and perceptions

The questionnaire asks inhabitants about their attitude towards the present state of the environment in comparison to the last decade such as CPUE, type and size of fish, water quality. This part also focuses on inhabitants' perception of their current sanitary system by asking: "Have solid waste, wastewater been treated properly before discharge into environment? and did you feel satisfied with the current sanitary condition?" These also contained warm-up questions to inhabitants before asking about their willingness to pay.

Willingness to pay

The surrounding environment affects inhabitants directly on both economic activities and living conditions. It's essential to use natural resource efficiently for sustainable development. This part will include questions about inhabitant's perceptions of current environmental quality, how he or she feels about the proposed project, whether they would support carrying out the proposed project. The questionnaire is also designed to get information of their preferred payment vehicle for the project if they agree to contribute, otherwise, they are asked about the reasons for the no contribution.

The survey suggests fund-raising for three sub-projects: natural conservation, improving environmental conditions such as drainage and wastewater treatment system; and solid waste collection and treatment. Until now, there is no landfill or wastewater treatment system in the island, so effluents are discharged directly into the sea or reservoir. Therefore, the two environmental condition improvement projects are essential. It begins with a short description of current state of the environment in Phu Quoc and presents a hypothetical scenario to solve these problems. It applies open-ended questions for both projects asking about the amount which the resident is willing to pay for the proposed project "How much would you be willing to pay...?" This elicitation method provides straightforward actual valuation of amenities. The payment mechanisms for nature conservation program are environmental tax or donation while there are three types of payment for the rest: paid as part of the utility bill, environmental tax and donation. The money collected would be managed by a Board of Trustees from representatives from the People's Committee and the private sector.

Last concern refers to revelation of the reason why the residents wouldn't be willing to pay for the proposed project by asking "Why would you not vote for the program?" There are five possible reasons for that

decision phrased as: “I can’t afford”, “I am satisfied with the current status”, “it is the local government’s responsibility”, “I do not believe the money will be used for program” and “the information is not clear”.

3.2 Sampling design

3.2.1 Collection of Primary Data

Surveys may be collected through:

- Self- administered questionnaire
- Face to face interview
- Phone interview.

The choice of survey collection method depends on the situation and often on the researcher’s budget. Each survey method has both advantages and disadvantages, the study explains all in detail in the following.

Self – administered questionnaires

The self-administered questionnaire is a questionnaire that a respondent does the survey by his or herself. Self-administered questionnaires have major advantage of potentially providing a large number of respondents in different locations, by hand, mail or via online questionnaires. However, the response rate is often low, so if the researcher wants a specific number of responses, the questionnaires must be spread out a much higher that number. For this method, the researchers must anticipate the possibilities for the target population, for example an online self-administered questionnaire requires literacy and potentially computer/online access of the respondents. The following-table shows its advantages and disadvantages which is sourced from Medanth Wiki (2012).

Table 1: Advantages and disadvantages of self – administered questionnaire method

Advantages	Disadvantages
• Questionnaires can be distributed to a large number of people, increasing the odds for a greater number of respondents	• Response rates can be low
• Lower costs than interviewing	• Possible clarity issues
• Reduced interviewer bias	• Possible language and literacy issues
• “Social desirability” answers may be less of an issue	• If online, possible access issues

Face to face interviews

In the contrast, the researcher approaches the respondents in personal, then asks them a series of questions and records their responses. Face to face interviews may be the most flexible method to collect data because of providing an opportunity for the interviewer to interact with the interviewee. The interviewer can clarify the questions which seem to be confusing or ambiguous to interviewee and avoid the respondents skipping a question. Besides, the interviewer also can select the sample of respondents in order to specific the demographic of the sample**.** The response rate and data quality are often higher than other methods and self-administered questionnaires in particular. However, it is the most costly and time-consuming method. As well as self- administrative questionnaire, it also has advantages and disadvantages as table-below which is sourced from Miller (2007).

Table 2: Advantages and disadvantages of face to face interview method

Advantages	Disadvantages
• Tend to have high response rates • Can ask more complex questions • Can enter responses directly into a computer saving data input time and reducing potential inputting errors • Facilitates recording of time the survey was taken • Does not require interviewee's contact information before conducting the survey.	• Generally expensive • Bias may be introduced by the interviewer • It may be difficult to identify locations and times to interview to assure a representative sample • Respondents may be limited to providing expected expenditures for their visit rather than actual expenditures, as their visit is not completed.

Telephone interviews

Telephone surveys, like face-to-face interviews, allow a two-way interaction between researcher and respondent. Telephone surveys are quicker and cheaper than face-to-face interviewing. Whilst resulting in a higher response rate than postal surveys, telephone surveys often attract a higher level of refusals than face-to-face interviews as people feel less inhibited about refusing to take part when approached over the telephone.

If patron telephone numbers are available, telephone surveys may be an option. Similar to mail surveys, place of residence of patrons is needed to tally the number of visitors that come from outside the region

relative to local residents. Because of the popularity of cell phones, relying on the local exchange to delineate local and tourist patrons may produce misleading results. Telephone interviews combine the benefits of interviews and mail surveys. They allow more complex questions to be asked since the interviewer can clarify confusion and can be administered over a wide geography. However, phone surveys tend to be expensive and taxing on interviewers. The table-below presents its strong and weak points which are sourced from Miller (2007).

Table 3: Advantages and disadvantages of phone interview method

Advantages	Disadvantages
• Relatively easy to supervise staff • Can address more complex questions • Can be conducted over a large geography • Can be administered after the event has taken place to account for all expenditures.	• People with no phones are excluded • The best person to respond to the survey may not be the respondent • Households may screen their calls • Bias may be introduced by the interviewer • Projected response rate is difficult to estimate.

Due to constraints of time and budget, this study applies self-administered questionnaires for the tourists to reach a large enough number of potential respondents in a variety of locations. The online questionnaire was created via domain Kiwiksurveys.com to collect significant tourist observations while the rest was done by self-administered questionnaire in paper in Phu Quoc island. Because willingness – to – pay is the new idea to Phu Quoc's inhabitant, this study conduct face to face interview in order to avoid information bias of CVM method. However, there is just a small sample of inhabitants that completed the survey.

3.2.2 In practice

3.2.2.1 Tourist survey

Tourist survey was conducted by both online and on-site method, however, nearly half by self-administered questionnaires via the website http://kwiksurveys.com?s=OMHEKK_35ddb4cd. It was posted on my facebook and several forums of travel guides websites, for instance, Tripadvisor, VirtualTourist, Travelfish, Sgholiday, webtretho. Online survey was opened the public from 15 December 2011 to 29 Febuary 2012 and collected 86 responses. However, there are only 49 valid responses for TCM survey in total of 108 observations. Apart from the rest were done by filling questionnaire left at each room of Anh Duong hotel

and collected at Hotel reception. Tourists before they left island were also intercepted at Rach Gia habor in the afternoon of 3th January and at Phu Quoc airport in the morning 7th Janunary 2012. The online questionnaire of tourist survey is also designed to collect data from tourist who has not visited Phu Quoc but are willing to do in near future. There are total of 144 observations for tourist survey applied CVM method.

3.2.2.1 Inhabitant survey

The survey was conducted on-site from 29 December 2011 to 7th January 2012 by way of face to face interviews. Local residents are intercepted in Duong Dong Town, Ham Ninh market and some households on the way from Duong Dong to Ham Ninh Town. Despite the effort in collecting a sufficiently large sample, only 15 observations were completed. Willingness-to-pay for nature conservation or some environmental improvement projects is a very new idea for the residents. Moreover, it seems that residents had some prior experience with some fake environmental advocacy groups than inhered their trust in answering surveys. Besides that, the two proposed projects regarding environmental improvement, wastewater and solid waste treatment, are not familiar to local population, as they have never previously existed in the island before. I believe these reasons justified the low responses to the inhabitant survey.

3.2.3 Collection of Secondary Data

This study is using a variety of secondary data such socio – economic characteristic, geographic, environmental assessment report, etc. The data are mainly collected from several local authorities, via website and through national report. Source of secondary data were:

- National Statistics are the source for time series data of Phu Quoc socioeconomic characteristics, number of international arrivals, census of population and housing, etc. The island environmental and tourism report are obtained from Department of Natural Resources and Environment and Department of Tourism in Kien Giang respectively.
- Kien Giang Biospheres Reserve supplied the geographic and topography report.
- The Phu Quoc Master plan until 2030 and other related regulation were obtained from the People's Committee.

IV. DATA ANALYSIS

4.1 Tourist survey

4.1.1. Travel cost data

We start the analysis by focusing on some descriptive statistics. The mean of total expenditure is 242 dollars (SD=190) for the average time of 3.43 days (SD=0.76) on Phu Quoc island, which calculates that the daily expenditure is equal to 70.64 dollars. This value is fairly low in comparison with the other popular sites in Vietnam such as Hanoi, Hue and Ho Chi Minh cities (155.8, 69.23 and 145.89 dollars respectively, according to Vietnam General Statistics, 2009). The largest portion is spent on accommodation, which accounts for 31%, entertainment and travel cost is subsequent; this implies that a high portion of tourist expenditure contributes to local economy; therefore, inhabitants can get high profit from tourism.

Table 4: Tourist expenditure for Phu Quoc trip

Expenditures	Observation	Mean	Std Dev	Share(%)
Travel cost	108	57.55	38.70	23.7
Accomodation cost	108	75.19	63.54	31.0
Food cost	108	45.70	34.25	18.9
Entertainment cost	108	63.94	76.24	26.4
Daily expenditure*		70.64		
Total cost	108	242.38	190.92	100.0

Note: * Includes cost of accommodation, food and entertainment, the share is over total cost.

Nearly half (44%) of the sample is comprised of foreign tourists and 56 % are domestic tourists. The data recorded the average income of 2127 dollars (SD = 1308) for foreign tourists and the standard deviation is notable high, as a consequence of the clear contrast between foreign tourists from Asia and others countries. The average income of domestic tourists is 359 (SD=465). In this survey, domestic tourists are likely to have lower income than foreigners.

Table 5: Monthly income of foreign and domestic tourists

Income	Observations	Mean	Std. Dev.	Min	Max
Foreign tourists	48	2127.083	1308.095	125	4600
Domestic tourits	60	359.1667	465.6635	125	3500

There are two ways to access the island, by airplane or ferry and bus. Airline ticket is extremely more expensive than ferry, so bus and ferry is the favorite form of transport for 60% of responders.

Table 6: Means of transportation to Phu Quoc island

Means of Transport	Frequency	Percent
Airplane	42	39.25
Bus and Ferry	65	60.75
Total	107	100.00

In terms of the activities undertaken by tourist, all tourists enjoyed swimming, followed by snorkeling and shopping. It can be concluded that beach visit is the most important activity in Phu Quoc, and the beach quality is the major factor to tourist experience on the island. On the other hand, high percent of shopping value (53%) means that there is an opportunity for the local authorities and residents to fulfill this demand leading to a possibility of gaining more income.

Table 7: Activities which tourists spent most on Phu Quoc island

Activities	Frequency	Percent
Swimming	108	100.0
Snorkeling/Diving	61	56.5
Kayaking/Sailing	40	37.0
Trekking/Hiking	24	22.2
Camping	3	2.8
Shopping	58	53.7
Local cultural activities	50	46.3

Questions about tourist attitude suggest that they rate the highest value to biodiversity and lowest to beaches cleanliness. Respondents rate the quality from “very bad” to “very good” to correspond with 1 to 5. Tourists valued the biodiversity condition rather high (Median=4, SD=0.77) in comparison with hygiene (Median=3, SD=0.81) and cleanliness condition (Median=3, SD=0.76). If the low value of beach cleanliness occurs in long - term, it may reduce the island’s attraction. In addition, hygiene condition and garbage treatment are also significant factors in tourists’ answers to the question on priority given to environmental issues. These are all the visual problems and reflect the status that tourists overwhelm the

island. The local authorities need more efforts to improve the current condition. The survey also reveals that the tourist's satisfaction with their last trip to Phu Quoc is "as expected" for 77% of the tourists.

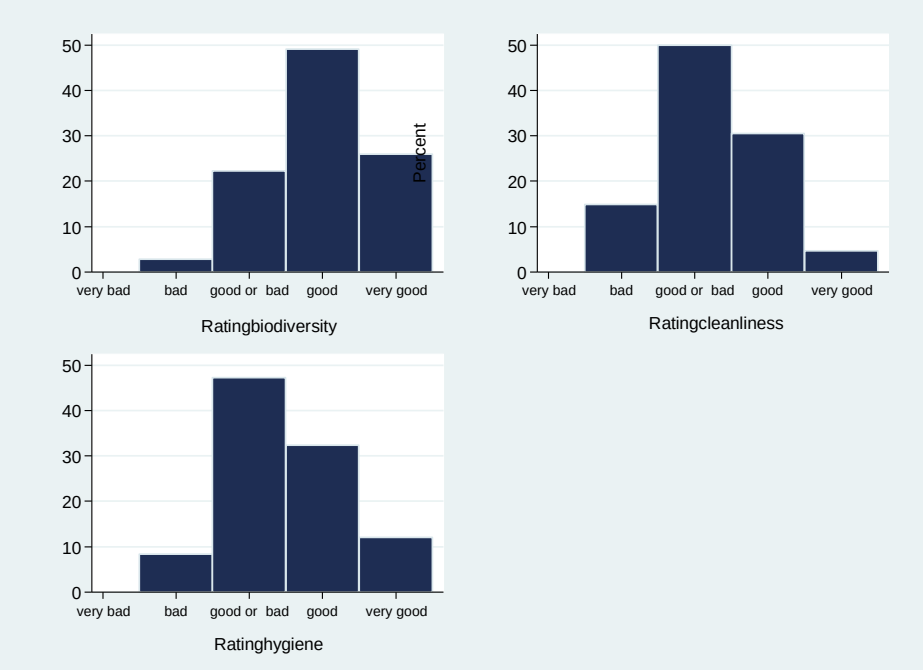

Figure 6: Rating environmental and hygiene condition in Phu Quoc island

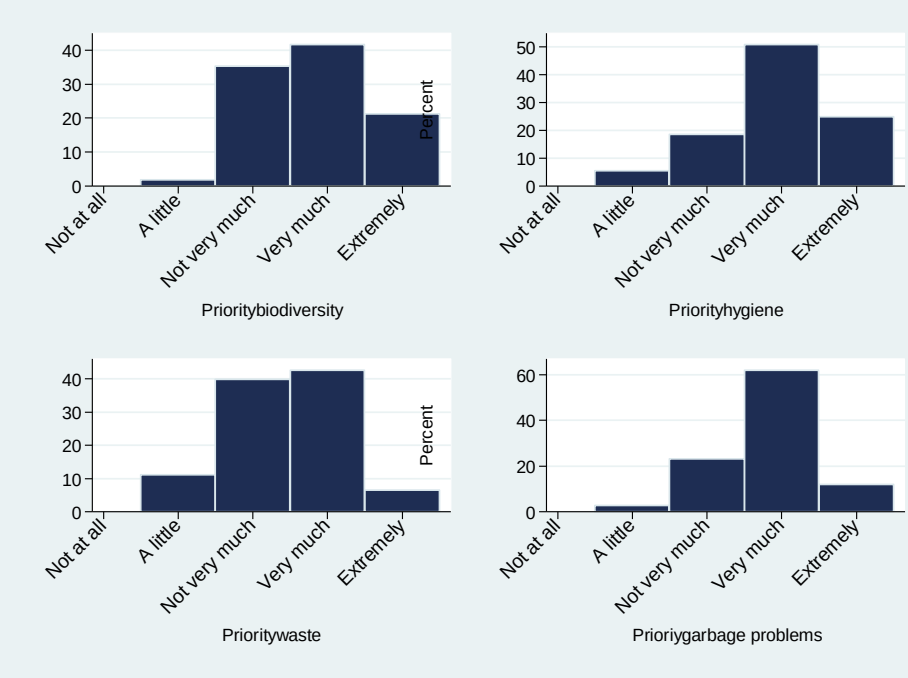

Figure 7: Rating the priority problems in Phu Quoc island

The following table presents a summary of the variables pertaining to tourists' attitude and perception of Phu Quoc environment.

Table 8: Tourists' attitudes and perceptions to Phu Quoc environment

Variable	Observation	Median/Mean	Std. Dev.	Min	Max
Biodiversity quality	108	4	0.773165	2	5
Cleanliness quality	108	3	0.762742	2	5
Hygiene quality	108	3	0.814374	2	5
Priority biodiversity issue	108	4	0.783339	2	5
Priority garbage issue	108	4	0.662761	2	5
Priority wastewater issue	108	3	0.777407	2	5
Priority solidwaste issue	108	4	0.813258	2	5
Environmental policy	108	0.4907*	-	0	1
Expectation	107	2	0.47546	1	3

Note: *The environmental policy variable is reported the mean value.

For demographic data, most of participants are adult from ages 20 to 50, in which 59% are male. The education level of respondents is high (M=2.01, Median=2; SD= 0.54) and over 70% of respondents have graduated (Figure 8: variable coding high school or less =1, graduated=2, post graduated=3). As with income, the education level of the domestic and the foreign subsamples is significantly different. Foreign tourists have higher education level than domestic tourists (Figure 8).

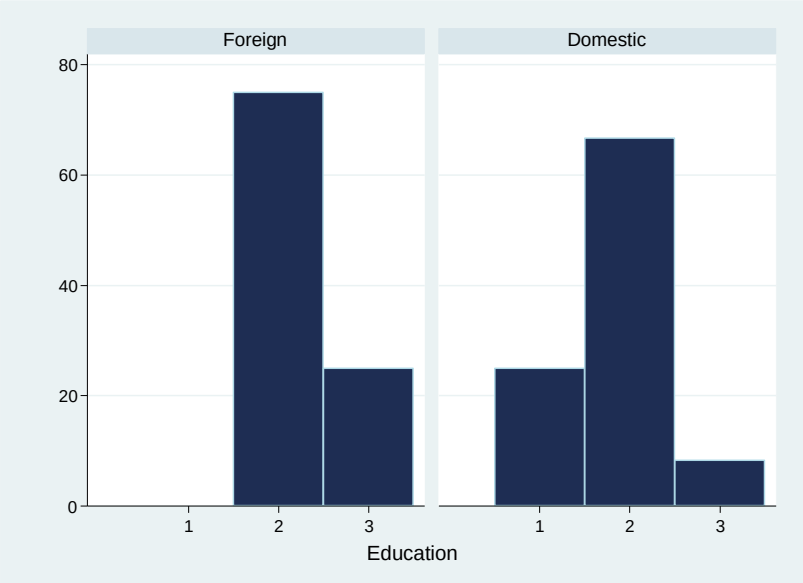

Figure 8: Education variable between domestic and foreign tourist in survey

The study just focuses on several variables as equation (1) to estimate the island' recreational value, for instance, number of trips, travel cost of Phu Quoc, travel cost to alternative site and demographic variables. The table-below shows the data summary of variables mentioned above for 108 observations.

Table 9: TCM Data summary

	Mean	**Standard Deviation**	**Min**	**Max**
Number of trips	2.08	1.22	1	8
Number of days	3.43	0.764555	2	5
Tcr	59.73	40.44	13.23	171.7
Tcs	32.47	48.03	0	126.71
Foreign (Vietnamese =1, foreigner =0)	0.55	-	0	1
Age	38.96	10.7	17	50
Sex (male = 0, female = 1)	0.59	-	0	1
Marry (Single =0, married =1)	0.5	-	0	1
Education (high school or less =1, graduate =2, post graduate =3)	2.01	0.54	1	3
Income	1144	1284	125	4600

Notes: tcr is travel cost to Phu Quoc including 1/3 hourly wage; tcs is travel cost to substitute site including 1/3 hourly wage and income is monthly salary.

According to our data, tourists are likely to return Phu Quoc for leisure (M=2.08, SD=1.22) and stay overnight (M=3.43, SD=0.76), as 40% of tourists had visited Phu Quoc twice, about 20% is three times and over, which is illustrated by graph-below.

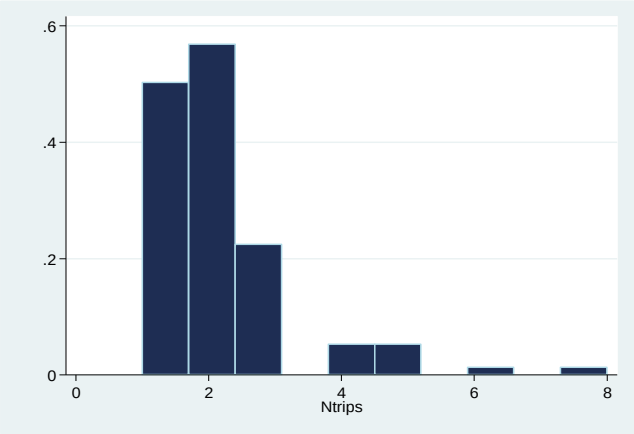

Figure 9: Distribution of individual visits

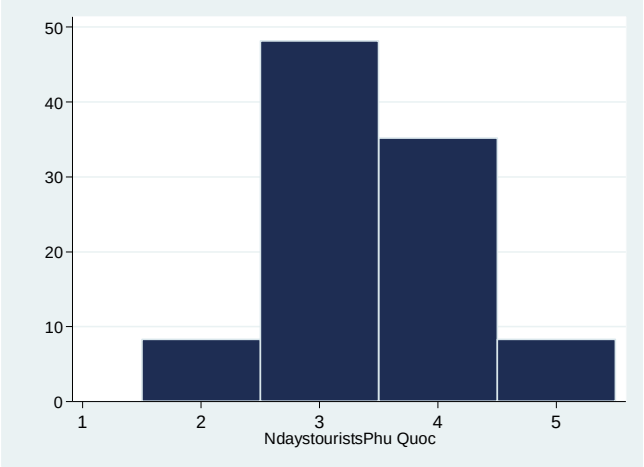

Figure 10: Number of days on Phu Quoc

At first, I used Negative binomial model, however the dispersion parameter (alpha) is insignificant, that means it equals zero, therefore, I used the Poisson model instead to analyze the data. The outputs are presented in Tables 10 and 11.

The marginal effect of travel cost presents the expected negative sign and is statistically significant at 1% level. High travel costs incurred by individuals have a negative impact on number of trips to Phu Quoc, an increase in 1 USD decreases the number of visits by 1,29% on average. The more respondents have to pay to get to the islands, the less the frequency of their visits. It is possible to conclude that tourists who live far from Phu Quoc have lower demand to visit the island than those who live near.

The income variable effect is found negative and insignificant on recreational demand. This result may arise due to the considerable difference in income between Vietnamese tourists and foreigners.

Table 10: Travel cost Poisson regression result

Variable	Coefficients
Tcr	-.0064994***
	(.0017883)
Tcs	.0002718
	(.0009174)
Foreign	-.217332
	(.1409472)
Age	-.0049121
	(.0066871)
Sex	.0597142
	(.0987909)
Marry	-.1541575
	(.1143197)
Education	-.0457336
	(.1106853)
Income	-.0000761
	(.0000546)
Constant	1.603715***
	(.4890563)
Observations	108
P>chi2	0.0000
Log pseudolikelihood	-160.23481

Note: Robust standard errors in parenthesis; (*) significant at 10%; (**) significant at 5%; (***) significant at 1%

There is a positive sign between the travel costs to substitute sites and the demand to visit Phu Quoc island. The sign of the coefficient on the *tcs* variable is compatible with the hypothesis that the demand for a site increases when the costs for the substitute site increase. However, in this study, the effect is statistically insignificant. For the goods or service as tourist destination, it is difficult to estimate travel cost

to one site accurately, tourists often give the travel cost of the single site trip or the whole of multiple destinations trip.

The marginal effects for the Poisson model are as follows:

Table 11: Marginal effects of all coefficients after Poisson regression

Variable	dy/dx	Robust Standard Errors
tcr	-.0129716***	.00362
tcs	.0005424	.00183
fore*	-.439889	.28698
age	-.0098038	.01335
sex*	.1185393	.19644
mar*	-.3076706	.23053
edu	-.0912759	.22172
income	-.0001518	.00011
Prediction = 1.9958195		

Note: (*) dy/dx is for discrete change of dummy variable from 0 to 1;
(*) significant at 10%; (**) significant at 5%; (***) significant at 1%

From the estimated regression equation expected number of trips is calculated equal to 1.91. Individual consumer surplus for Phu Quoc trip:

$$A = -\frac{r}{\beta_{tcr}} = 294.043$$

Total recreational benefit of Phu Quoc island is computed by multiplying individual consumer surplus by the annual number of visits. With the total number of visitors to the islands of 217,000 (Vietnam General Statistics, 2009), the total recreational benefit is estimated to be 63.807 million dollars USD per year.

4.1.2. Contingent valuation data

The contingent valuation data is collected from tourist surveys like travel cost data, however the number of observation is higher (N=144) because it also accounts for non-visitor to Phu Quoc through online survey, who intend to visit in the near future. This study valuates the total economic value including use and non-use value of the island.

Respondents are relatively adult (M=37, SD=10.22), in which 69% is female, nearly half (47%) is married. Education level is high, which is recorded 67% graduate and 21% post graduate. 65% of tourists taken the survey are domestic (Figure 12). Similar to travel cost data, the income value is high but spreads over a wide range (M=1103, SD=1357). It is also explained by significant salary difference between Vietnamese and foreign tourists (Figure 11).

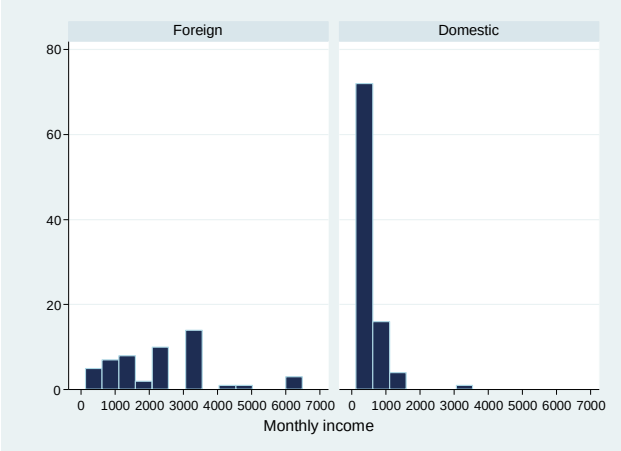

Figure 11: Monthly income between domestic and foreign tourists

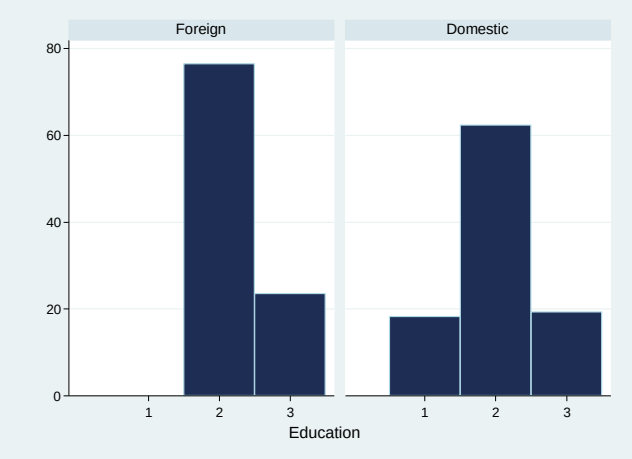

Figure 12: Education between domestic and foreign tourists

There are two programs in the contingent valuation study: natural conservation and environmental improvement. Each program is designed by open-ended questions and to get four main details: whether tourist is willingness to pay or not, amount paid for program if answer is yes, method to pay and reason for not contribute to program. The variable names are abbreviated and described as following table.

Table 12: CVM Variable description

Variable	**Description**
Natur	Willingness to pay for Nature Conservation program (Yes=1, No =0)
WTPnatur	Amount paid for Nature Conservation program
Methnatur	Method to pay for Nature Conservation program
Nonature	Reason for not contributing Nature Conservation program
Env	Willingness to pay for Environmental improvement program (Yes=1, No =0)
WTPenv	Amount paid for Environmental improvement program
Methenv	Method to pay for Environmental improvement program
Nonenv	Reason for not contributing Environmental improvement program
Fore	Foreigner (Vietnamese =1, foreigner =0)
Age	Age
Sex	Gender (male = 1, female = 0)
Mar	Marital status (Single =1, married =0)
Edu	Education (high school or less =1, graduate =2, post graduate =3)
Income	Monthly salary

The WTP tourists' data is summarized as following table

Table 13: WTP tourist data summary

Variable	Observation	Mean	Std. Dev.	Min	Max
natur	144	.8402778	-	0	1
wtpnatur	144	5.956597	10.9956	0	100
methnatur	118	2.067797	.8645815	1	4
nonature	24	2.541667	1.473805	1	5
env	144	.4791667	-	0	1
wtpenv	144	.8350694	4.216236	0	50
methenv	65	1.2	.4031129	1	2
noenv	73	2.863014	.9023899	1	5
fore	144	.6458333	-	0	1
age	144	37.13889	10.22038	17	50
sex	144	.5208333	-	0	1
mar	144	.5347222	-	0	1
edu	144	2.090278	.5660956	1	3
income	144	1103.479	1357.783	125	6000

According to survey data, there are 84% of respondents willing- to- pay for natural conservation in comparison with 48% for environmental improvement. Tourists want to have extensive experience on Phu Quoc and feel responsible to contribute to nature conservation. Though environmental condition is still significant impact to their holiday on the island, tourists think that is the authority responsibility. It is consolidated by the event that 54% of not-paying tourists for environmental improvement say it is because of this reason. The remarkable detail is percent of answers for the reason not voting natural conservation and environmental program, 29% and 13% respectively. It may be due to the governmental fault or some cheats in the past. In order to estimate precisely, the study separates the decision, between deciding to contribute and the amount contributed for each program. The decision to pay for the programs *natur* and *env* will be analyzed by Probit regression while the average *wtpnatur* and *wtpenv* by Tobit regression.

Tourists not only prefer to contribute more to National Conservation than Environmental program but are also willing to pay higher amount with mean of 5.95 dollars (SD=10.99) and 1.74 dollars (SD=5.98) respectively.

Table 14: Method to pay to nature conservation and environmental program in tourist survey

Program	Method to pay	Freq.	Percent	Cum.
Nature conservation program	Entrance fee	28	23.73	23.73
	Accomodation bill	66	55.93	79.66
	Departure fee	12	10.17	89.83
	Donation	12	10.17	100.00
Environmental program	Entrance fee	52	80	80
	Donation	13	20	100

The data also reveals tourists are likely to choose the easier and clear payment vehicle to contribute to program. 66% of respondents said they prefer to pay with accommodation bill for natural conservation and 80% to pay as an entrance fee for environment. Preferences over payment method differ between domestic and foreign tourists and between the two programs. For the Nature conservation program, foreigners clearly prefer payment through the accommodation bill. Domestic tourists don´t have a very clear preference for one method over the other (Figure 13), although the accommodation bill is the most frequently chosen. For the Environmental program, foreign tourists unanimously prefer to pay through the entrance fee, while domestic tourists now exhibit a clear preference for donation (Figure 14).

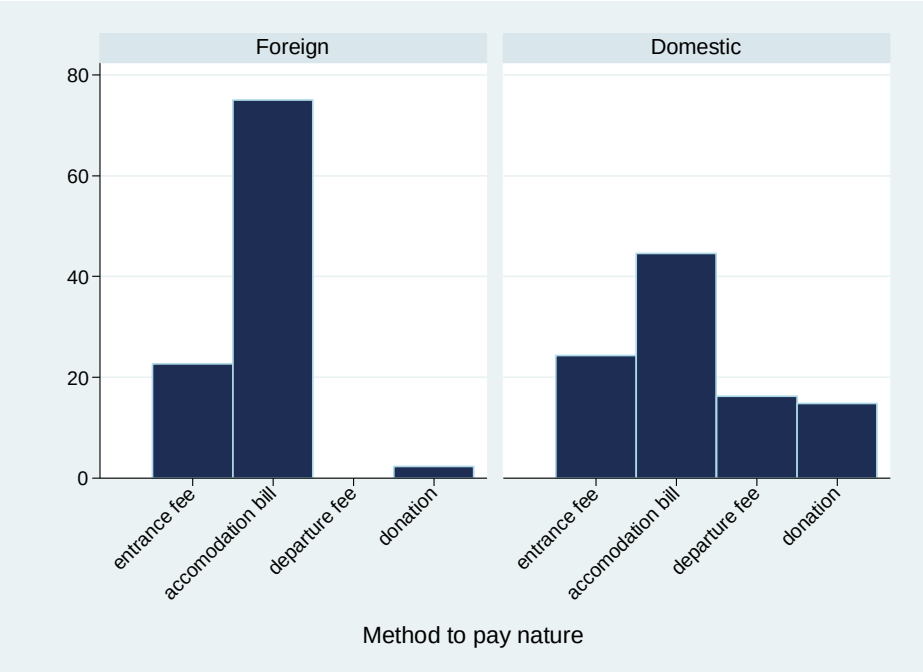

Figure 13: Method to pay to nature conservation program in tourist survey

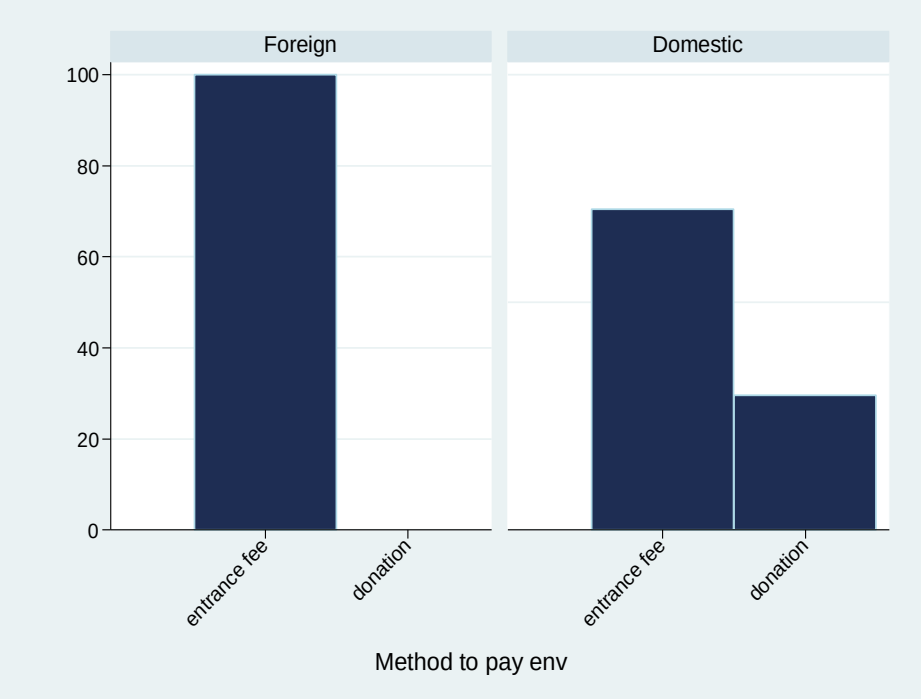

Figure 14: Method to pay to environment program in tourist survey

The tourists' decision to contribute is analyzed by Probit regression model. Following tables 15 and 16 presents the results of two programs for 144 observations.

Table 15: Probit regression for decision voting for program

	Natural conservation	**Environmental improvement**
Fore	.8134718	.9194379**
	(.54061)	(.39226)
Age	.0080201	.0060585
	(.02115)	(.01684)
Sex	.0790743	.2109372
	(.31328)	(.22901)
Mar	.1288829	.0696238
	(.30756)	(.22527)
Edu	1.465612 ***	.7616226***
	(.3278)	(.20969)
Income	.0009923**	.0002965***
	(.00048)	(.00012)
Constant	-3.353621**	-2.941571***
	(1.1809)	(.95082)
Observations	144	
P>chi2	0.0001	0.0018
Log pseudolikelihood	-41.776	-89.208

Note: Robust standard errors in parenthesis; (*) significant at 10%; (**) significant at 5%; (***) significant at 1%

The marginal effects after Probit are presented as table – below:

Table 16: Marginal effects of all coefficients after Probit

Variable	Nature conservation	Environmental program
fore	.0912225	.3483369***
	(.07422)	(.13534)
age	.0007063	.0024131
	(.00194)	(.00671)
sex	.0069872	.0838408
	(.0277)	(.09068)
mar	.0114542	.0277221
	(.03044)	(.08965)
edu	.1290663*	.3033583***
	(.07855)	(.08351)
income	.0000874***	.0001181***
	(.00003)	(.00005)
Prediction	.95	.47

Note: dy/dx of fore, sex mar variables are for discrete change of dummy variable from 0 to 1; Standard errors in parenthesis; (*) significant at 10%; (**) significant at 5%; (***) significant at 1%

Both regressions are statistically significant. The predicted probability of voting in favor of the program are 95% and 47% for the nature conservation and for the environmental improvement program, respectively. Significant contributors for these decisions are income and education. In the case of the environmental preservation program, foreigners are significantly more willing to participate than domestic tourists.

Next, the study applies Tobit regression to estimate mean of WTP of above two programs.

Table 17: Tobit regression for WTP tourist

	Natural conservation	**Environmental improvement**
Fore	8.61462*	3.594725*
	(5.0109)	(2.2287)
Age	0.293465	-.023401
	(.28715)	(.08267)
Sex	1.76161	2.101936
	(2.0385)	(1.7585)
Mar	0.48622	-1.012588
	(2.6893)	(1.4397)
Edu	4.813531***	2.593856**
	(1.6154)	(1.2833)
Income	0.002361**	.0009946*
	(.00097)	(.00061)
Constant	-25.84958	-11.06669**
	(17.4758)	(4.9898)
Observations	144 at wtp ≥ 0	
p>chi2	0.0025	0.4116
Log pseudolikelihood	-486.28	-263.0778

Note: Robust standard errors in parenthesis; (*) significant at 10%; (**) significant at 5%; (***) significant at 1%

The marginal effects after Tobit regression are shown as table-below.

Table 18: Marginal effects of all coefficients after Tobit regression

Variable	Nature conservation	Environmental program
fore	8.614624*	3.594725*
	(5.0109)	(2.22873)
age	.2934649	2.101936
	(.28715)	(1.75853)
sex	1.761611	-.023401
	(2.03855)	(.08267)
mar	.4862175	-1.012588
	(2.68932)	(1.43973)
edu	4.81353***	2.593856**
	(1.61545)	(1.28332)
income	.0023613***	.0009946*
	(.00098)	(.00061)
Prediction	4.4577027	<0

Note: dy/dx of fore, sex mar variables are for discrete change of dummy variable from 0 to 1; Standard errors in parenthesis; (*) significant at 10%; (**) significant at 5%; (***) significant at 1%

Although only the nature conservation regression is significant at conventional levels, results for both programs are reported. The marginal effect of *fore* and *edu* variable are simultaneous statistically significant, same positive sign and consistent with nature conservation program. A notable positive effect on *fore* variable implies that Vietnamese tourist were willing to pay less than foreigners (coding Vietnamese=1, foreigner=0). This study also shows the importance of education factor to tourists willing to pay by the evidence of positive and significant coefficient of *edu* for both programs. Tourists with higher education are likely to contribute more to National Conservation and Environmental program.

The marginal effect on the *income* variable is statistically significant and positive for natural conservation program and the environmental program, although significance level in last case is much smaller. That fault is caused by limitation of observations while great numbers of tourists saying "no" for Environmental program. *Income* with positive sign indicates that the relative probability of a 'yes' increases with their salary increase and the amount they are willing to pay also increases which is suitable with economic theory.

The estimated Tobit regression equation outputs the value of *WTPnatur* is 4.46 and a negative value to *WTPenv*, denoting the poor quality of the regression results obtained, and is compatible with the results

from Probit regression on tourists' decision not to contribute to environmental program, note that this regression is not statistically significant and is only reported for methodological reasons. The use and non-use value of natural on Phu Quoc island is calculated by multiply this WTPnatur to number of tourists to the island of 217,000 and equals 0.96 million dollars (Vietnam General Statistics, 2009). This economic value is very lower than above recreational benefit obtained by Travel cost model. It can be concluded that the economic value of nature on island is still hidden, underestimated and tourists haven't recognized it fully.

4.2 Inhabitant survey

Due to small samples taken (N=15), the CVM data for inhabitant has just been analyzed by the descriptive analysis. The inhabitants who took the survey are all adult, main income earners in family and relatively close in age (M=31.33, SD=5.163), in which 67% is male, nearly all are married (93%) and family size is 2.267 (SD=1.624). Education level is recorded 73% high school, 20% graduate and only a person post graduate. The monthly average income of the island inhabitant is 208.33 dollars (SD = 147.2), which is nearly double Vietnam per capita income of 1300 dollars which means about 108 dollars per month (Vietnam General Statistics, 2011). However, due to small sample (N=15), it doesn't show the islanders have higher average income than Vietnamese in common.

Table 19: Education percentage of inhabitant survey

Education	Freq.	Percent	Cum.
1	11	73.33	73.33
2	3	20.00	93.33
3	1	6.67	100.00
Total	15	100.00	

The data also shows that 60% respondents aren't satisfied with the current hygiene condition. The island residents answered the questions about environmental issues by choosing the priority from "least important" to "most important" for water pollution, solid waste treatment marine and terrestrial degradation issues, corresponding with 1 to 5. The result presents the highest value to marine degradation (Median=4 SD=0.834), water pollution (Median=4, SD=0.561) and solid waste problems (Median=4, SD=0.157). These values show that all environmental problems raised in questionnaire are urgent issues, although marine life degradation is the one considered extremely important by a higher percentage of the respondents (Figure 15). The variables are described and summarized as following table.

Table 20 : CVM Data summary

Variable	Description	Natural	Wastewater	Solid waste
Wtpnature	Amount paid for Nature Conservation	1.1 (1.423)	-	-
Wtpenv	Amount paid for wastewater treatment system	-	0.125 (0.154)	-
Wtpsolid	Amount paid for solid waste treatment system	-	-	0.102 (0.157)
Satisfy	Satisfaction with present hygiene status (yes =1, no =0)	-	.4 (-)	
Pwater*	Priority to solve water pollution issue (very insignificant = 1, very significant =5)	-	4 (0.561)	-
Psolid*	Priority to solve solid waste issue (very insignificant = 1, very significant =5)	-	-	4 (0.458)
pnatur1*	Priority to solve marine degradation issue (very insignificant = 1, very significant =5)	4 (0.834)	-	-
pnatur2*	Priority to solve forest and wildlife degradation issue (very insignificant = 1, very significant =5)	3 (0.834)	-	-
Mem	Family size		2.267 (1.624)	
Age	Age in years		31.33 (5.163)	
Sex	Male = 1, female = 0		.6666667 (-)	
Mar	Marital status (Single =1, married =0)		.0666667 (-)	
Edu	Education (high school or less =1, graduate =2, post graduate =3)		1.333 (0.617)	
Income	Monthly salary		208.33 (147.2)	

Note: Mean value for all variables were presented in the table except *pwater, psolid, pnatur1, pnatur2* is replaced by median; Standard deviation is in parenthesis.

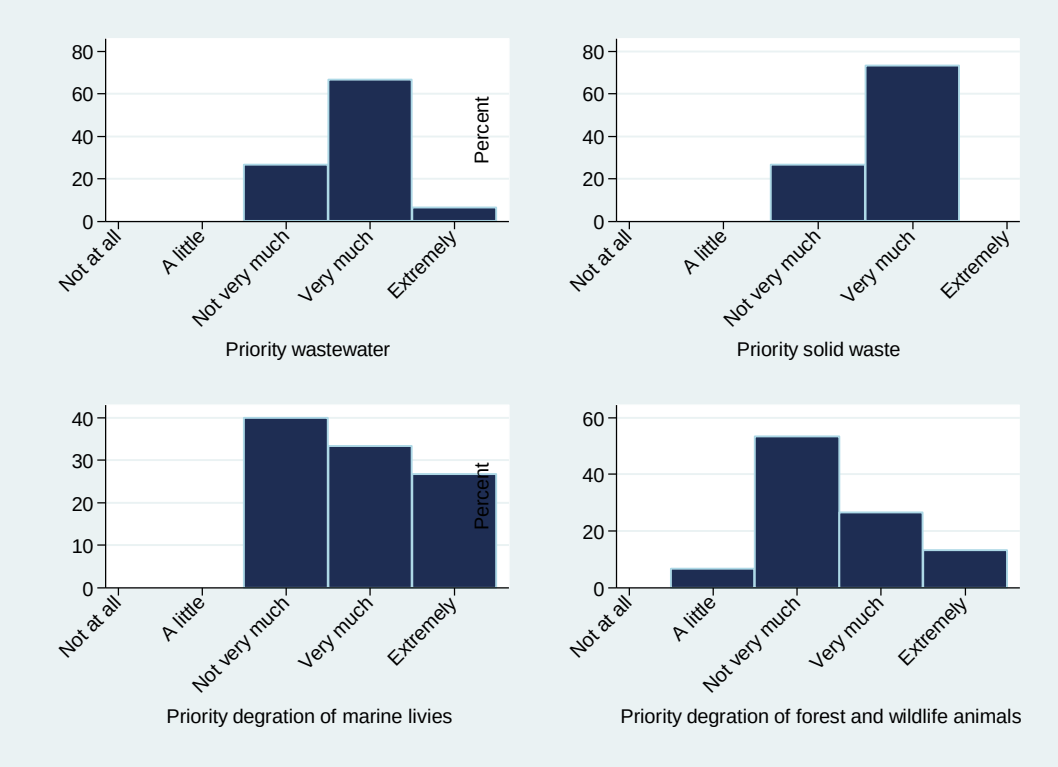

Figure 15: The priority of environmental issues in Phu Quoc island

There are three programs in the contingent valuation design: natural conservation, wastewater and solid waste treatment system. Each program is designed by open-ended questions and to get four main details: whether residents are willingness to pay or not, amount paid for program if answer is yes, method to pay and reason for not contributing to program.

The percentage of residents willing to pay for natural conservation, wastewater and solid waste treatment system programs decreases in sequence (80%, 60% and 40% respectively). Over 58% of those giving "yes" answer preferred donation than yearly environmental tax for natural conservation while most is likely to pay as part of utility bill for others. Almost all "no" answers are because inhabitants can't afford, the reason "satisfy with current status" comes after for wastewater and solid waste program in particular. Local residents tend to contribute low amounts (WTP=0.1) to each of program.

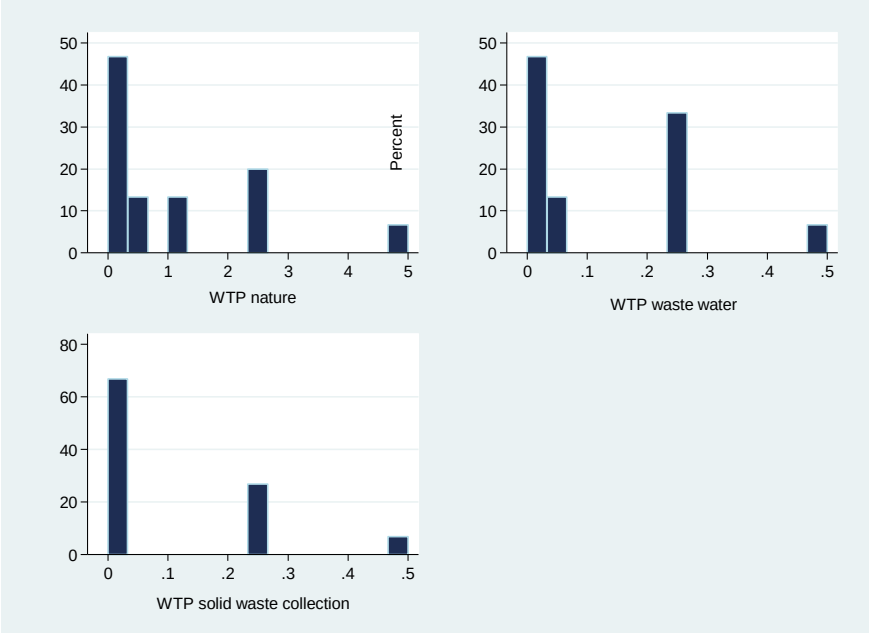

Figure 16: Amount WTP inhabitant willing to pay for nature conservation, wastewater and solid waste treatment

The preferred method for payment is the utility bill for the waste water and solid waste and the donation for the nature conservation case. Common to all three programs is the rejection of the environmental tax form of payment.

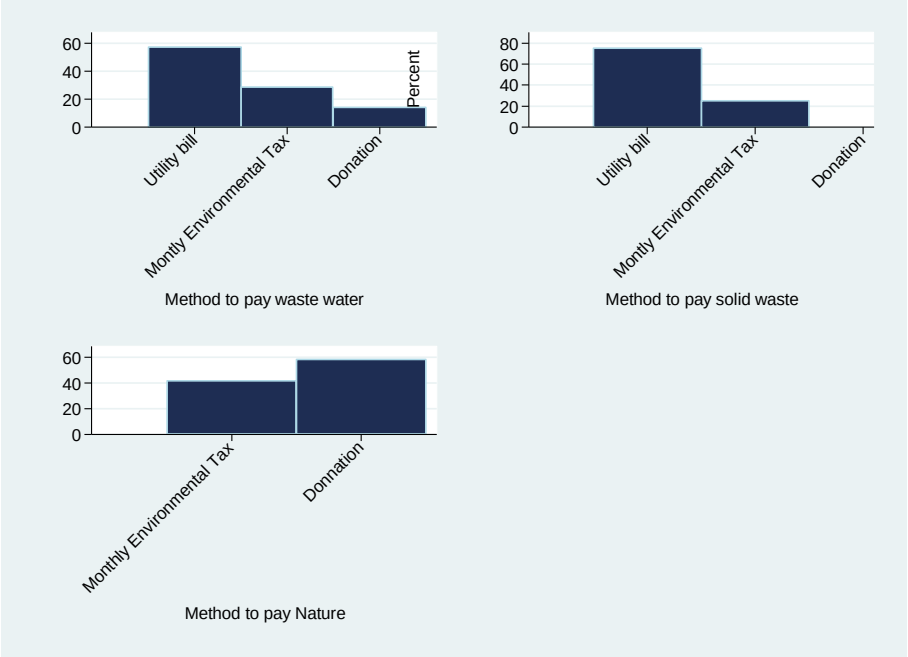

Figure 17: Method to pay to Nature conservation, wastewater and solid waste treatment program

V. CONCLUSIONS and SUGGESTIONS

The study solves the tough trade-offs between nature conservation and economic development, tourism in particular, which Phu Quoc island has been facing. The study applies two methodologies to reveal the island's environmental economic values, which are broken down as the direct use for recreation purpose and the indirect use for improving environmental condition. The most important contribution of the study is the output of the recreational value through Travel cost method to confirm the valuable natural resource in the island. With the current number of 217 thousand visitors a year, Phu Quoc is a very popular tourist destination in Vietnam and contributes with a large portion to Vietnamese tourism industry. The result show that the individual consumer surplus is of 294 dollars per year and the total annual recreational value is of 63 million dollars. This compares favorably to the estimated value of visitors to Monteverde cloud mountains in Costa Rica which is estimated as 264 dollars per visit according to study of Menkhaus & Lober (1996), although some adjustment for inflation rate is in order. This study's result is a little bit high compared to that value, but considering that fifteen years have passed, recreational value of Phu Quoc island is rather low. Two other studies, for instance, Seenprachawong (2001) and Pham & Tran (2001) also reveal recreational values for the case studies of islands. However, their results present the individual consumer plus separately for domestic and foreign tourists and there are significant difference between these values.

The contingent valuation outputs the Willingness-to-pay amount equal to 4.46 dollars per visit per tourists toward nature conservation program. This study's result is low compared to the value of Seenprachawong (2001) even for different subjects of local tourist (13 dollars) and foreign tourist (9 dollars).

The study is also concerned with the "willingness–to–pay" of the inhabitants to share the burden with local authorities. However, this study fails to elicit an accurate amount from local residents due to a low number of observations collected and calls for further research on a larger sample size. The study also explores important factors influenced the results of willingness – to- pay value for all of proposed programs to by tourists. The co-efficient of the education variable always appears positive and statistically significant, which shows the high impact of education to person's perspective on environment protection.

Given the TCM results, it is found that nature on Phu Quoc island is quite valuable. It is likely that natural forces such as global warming, by raising sea temperatures, will cause significant damage both in physical and economic terms to the island. Human activities threats, such as sand erosion, mass tourism and over exploitation should all be examined to determine whether the benefits of these activities are worth the

resulting damages. It is necessary to establish management programs to dissipate water pollution, reduce erosion, prevent mass tourism and limit unsustainable or destructive fishing, it could all be cost effective for local authorities. Additional travel cost studies should be done regularly to demonstrate precisely how valuable these resources are and why we should continue to preserve them.

The results of CVM explore the possibility of establishing a trusted fund for local authorities to preserve the island's nature. Tourism industry is being invested in to become a predominant economic sector for Phu Quoc island. Several urgent environmental issues on the island are associated with the tourism related-activities directly or indirectly such as water pollution, loss of biodiversity and marine degradation. It is reasonable for tourists to share those responsibilities with the local authorities and residents. One straightforward method is to adopt an appropriate user fee for tourists to visit Phu Quoc island as equal as the value that they state as their willingness-to-pay to nature conservation. This study suggests an equal basic entrance fee for both domestic and foreign tourist, which is 4.46 dollars and collected through accommodation bill. This payment mechanism is the tourists' favorite by survey and has the advantage to distinguish tourists with others. It is also possible to apply additional fee to who wants to visit vulnerable site, for instance, the particular coral reef area or National Park. That can prevent free rider problems for using public goods in Phu Quoc island.

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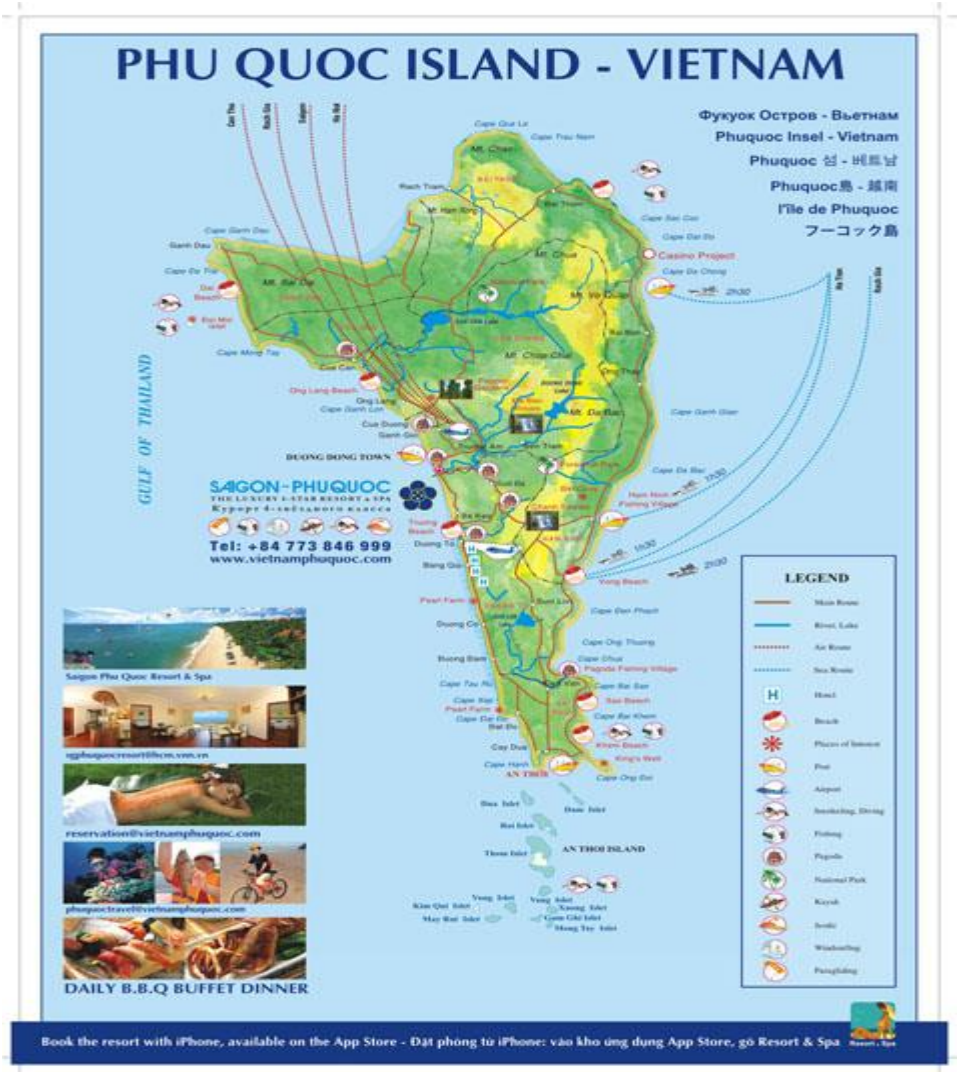
APPENDICES

Appendix 1: Questionnaire_ Introduction part

PHU QUOC ENVIRONMENTAL VALUE SURVEY



Picture: Phu Quoc tourist map (Source: Sai Gon Phu Quoc, 2011)

Phu Quoc island, a peaceful paradise, has been transformed into a world-class destination. It's dedicated to visitors with virgin forests, white sandy beaches, emerald sea water and a diversity of terrestrial and aquatic species. At the turn of the century, Phu Quoc was a secret and sleepy island with few tourist services and a poor infrastructure. However, today, many travel experts have warned that more and more signs of mass tourism have appeared. Though local authorities have carefully prepared the

Master Plan up to the year 2020, the problems of environmental degradation and irreplaceable scenery disappearance have still worsened.

In order to mitigate these problems and preserve the natural environment, this survey will be conducted to determine the environmental value of Phu Quoc island by both travel cost and contingent valuation method. It shall aid our understanding of both gains and losses between natural conservation and tourism, or economic development in common.

This is part of my study toward a Master Degree in Environmental Economics and Policy. It will obtain your socioeconomic information and perception of a hypothetical scenario for analysis. I would like to acknowledge your cooperation and all your data will be strictly confidential and just used for the present study.

Appendix 2: Tourist questionnaire

Part I: Tourist behavior

1. Have you ever been to Phu Quoc island in Viet Nam? YES ☐ (Go to Q. 3) NO ☐ (Go to Q.2)

2. Do you intend to visit Phu Quoc in a near future? YES ☐ (Go to Q. 33)

NO (Ending & Thank you)

3. How many times have you been there? ..... (days)

For number ≥ 2 go to Q.4

For number < 2 go to Q.5

4. Comparing to previous visits, how would you rate the condition of:

	Better	Unchanged	Worse
Biodiversity	☐	☐	☐
Environmental condition at beaches, tourist site	☐	☐	☐
Hygiene conditions	☐	☐	☐
Services and facilities	☐	☐	☐

5. On average, how many days have you spent in Phu Quoc?.....(days)

6. In your last trip, you travelled ....

Alone ☐

With a partner ☐

Family ☐ Please specify total participants .....

Group ☐ Please specify total participants .....

7. What was the main purpose of your last visit?

Leisure ☐

Business ☐

To visit relatives ☐

Other (please specify):.....

8. Was Phu Quoc the only destination of your visit? YES ☐ (Go to Q. 13) NO ☐ (Go to Q.9)

9. How many different destinations did you have (different countries or cities visited)? .....

10. How much was the total transportation cost of your trip to all destinations?.....

11. How much was the transportation cost from your home to the first destination and return in the trip to Phu Quoc? .....

12. How long did your travel take? ..... (days)

13. How did you get to Phu Quoc?

Airplane ☐

Bus ☐

Ferry ☐

Other (please specify).....

14. How much did it cost? ..... (Please specify the cost is per person or group)

15. How long did it take? ..... Hours

16. How have the following conditions affected your decision to travel to Phu Quoc?

	Extremely	Very much	Not very much	A little	Not at all
Cost/affordability	☐	☐	☐	☐	☐
Biodiversity	☐	☐	☐	☐	☐
Environmental quality	☐	☐	☐	☐	☐
Varieties and quality of tourist services (diving, trekking, camping, etc.)	☐	☐	☐	☐	☐
Facilities and amenities	☐	☐	☐	☐	☐

Other (please specify).....

17. Which activities have you spent most time on? (You can select more than one option)

Swimming ☐

Snorkeling/Diving ☐

Kayaking/Sailing ☐

Trekking/Hiking ☐

Camping ☐

Shopping ☐

Local cultural activities ☐

Other: Please specify.....

18. What was the total cost of your trip to Phu Quoc, including all expenses?.....

19. How much of the total amount in question 18 did you spend on:

Transport (including return ticket to island).....

Accommodation.....

Food.....

Entertainment.....

Other.....

20. How do you rate the quality of services and facilities in Phu Quoc?

	Very good	Good	Normal	Bad	Very bad
Road conditions	☐	☐	☐	☐	☐
Ferry, boat conditions	☐	☐	☐	☐	☐
Tourist sites	☐	☐	☐	☐	☐
Facilities and amenities	☐	☐	☐	☐	☐
Ambience (ex: peace and order)	☐	☐	☐	☐	☐
Overall experience	☐	☐	☐	☐	☐

21. How do you rate the biodiversity and environmental condition at Phu Quoc?

	Very good	Good	Normal	Bad	Very bad
Biodiversity	☐	☐	☐	☐	☐
Cleanliness of beaches	☐	☐	☐	☐	☐
Hygiene condition	☐	☐	☐	☐	☐

22. Did you use a public toilet in Phu Quoc? YES ☐ (Go to Q. 24) NO ☐ (Go to Q.27)

23. How did you feel about its cleanliness? Very clean ☐ Fairly clean ☐ Very dirty ☐

24. To improve cleanliness, would you be willing to pay per each use? YES ☐ NO ☐

25. How much would you be willing to pay per each use? .....

26. Do you think the local authority should build more public toilets and improve their sanitary condition?

YES ☐ NO ☐

27. Could you please prioritize the following problems in Phu Quoc?

	Extremely	Very much	Not very much	A little	Not at all
Biodiversity decrease due to economic development	☐	☐	☐	☐	☐
Garbage collection and treatment	☐	☐	☐	☐	☐

Hygiene condition for public service	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐

28. For sustainable development, do you agree with the new policy which potentially causes the number of tourists to Phu Quoc to annually decline? YES ☐ NO ☐ Don't know ☐

If possible, please specify your reason for your answer.....

29. Overall, did your last trip to Phu Quoc meet your expectation?

Higher ☐ As expected ☐ Lower ☐

30. Have you ever been to other destinations such as Cat Ba or Con Dao islands in Vietnam or Bali, or Phuket in Southeast Asia? YES ☐ (Go to Q. 31) NO ☐ (Go to Q.34)

31. How long were these trips? ..... days

32. How much was the total amount you spent in the last of these trips? .....

33. How much did you spend on travelling expenses in the trip? .....

Part II: Willing to pay (WTP)

Tourists favor Phu Quoc because of its biodiversity and peaceful environment. However, tourism has increased the amount of waste generated and not collected, which, in addition to the degradation of the landscape, constitutes a serious threat to wildlife habitat. To preserve the island's attraction, suppose the local authority needs a regular financial capacity to build more toilets, construct landfills and enhance protection of vulnerable species.

a. Natural conservation

34. Would you be willing to pay for Natural conservation in Phu Quoc?

The fees collected will be placed in a special account or trust fund with a Fund Manager and a Board of Trustees. Those will be selected from representatives of the local government, the private sector and the People's Committee. The trust fund shall be supervised by other stakeholders and audited by external auditors regularly.

YES ☐ (Go to Q. 35) NO ☐ (Go to Q.37)

35. How much would you be willing to pay for Nature conservation in Phu Quoc island?.....

36. For a program of Natural conservation, how would you prefer to pay?

Entrance / exit fee ☐

Paid with accommodation bill ☐

Paid with airline or ferry ticket to come to the island (as a departure fee) ☐

Donation ☐

Other :.....(please specify)

37. Why would you not vote for a program of natural conservation?

Can't afford it ☐

Satisfied with the current status ☐

That's the responsibility of local authorities ☐

Do not believe that the money will actually be used for this purpose ☐

The information is not very clear ☐

Other :.....(please specify)

b. Hygiene and environmental condition improvement

Building more public toilets

Collecting and treating waste at beaches

To keep this paradise

38. Would you be willing to pay to improve sanitary and environmental conditions in Phu Quoc?

YES ☐ (Go to Q. 39) NO ☐ (Go to Q.41)

39. How much would you be willing to pay to improve sanitary and environmental conditions in Phu Quoc island? .....

The fee would be collected and managed by the local People's Committee. This fund will be monitored regularly under Governance Law and publicized widely for tourists, residents.

40. To improve sanitary and environmental condition at tourist site, how would you prefer to pay?

Entry fee to tourist site ☐

Donation at local authority ☐

Other :.....(please specify)

41. Why would you not vote to improve environmental conditions?

Can't afford it ☐

Satisfied with the current status ☐

That's the responsibility of local authorities ☐

Do not believe that the money will actually be used for this purpose. ☐

The information is not very clear ☐

Other :.....(please specify)

Part III: Respondent's information

42. Are you a domestic or foreign tourist? Domestic ☐ Foreign ☐

If a foreigner, where are you from? .....

43. What is your purpose for travelling to Vietnam?

Leisure ☐

Business ☐

To visit relatives ☐

Others (please specify).....

44. How old are you ?

< 20 ☐

21 – 40 ☐

41 – 60 ☐

> 60 ☐

45. Your gender: Male ☐ Female ☐

46. Marital status Single ☐ Married ☐ Other ☐

47. If married, how many people are there in your family? .....people

48. Education:

High school or less ☐

Graduate ☐

Post graduate ☐

49. What is your current occupation? .....

50. Which category best describes your total household or family monthly income?

For local tourist (VND)		For foreign tourist (USD)	
Less than 5 million	☐	Less than $1000	☐
5 - 10 million	☐	$ 1000 - $ 2000	☐
10 - 15 million	☐	$ 2000 - $ 3000	☐
15 - 20 million	☐	$ 3000 - $ 4000	☐
20 - 30 million	☐	$ 4000 - $ 5000	☐
Over 30 million	☐	Over $ 5000	☐

51 Where did you hear about this survey?

Website ☐

Leaflet at hotel ☐

Leaflet at island's entry point ☐

Direct contact ☐

Other (please specify) .....

If you heard from a website, please specify the name.....

THANK YOU VERY MUCH!

Appendix 3: Inhabitant questionnaire

Part I: ENVIRONMENTS ATTITUDES AND PERCEPTIONS

1. Are you the main income earner in your family? YES ☐ NO ☐

2. Who is the main income earner in your family? .....

3. How many people live in your household?

Elders: .....

Adults:.....

Children:.....

4. Comparing between the last 10 years and today, how would you describe the changes in the sea fisheries activities and quantity and quality of fishes in Phu Quoc island?

Using symbol : " - " : less, "0": same, "+": better

	No. of fisherman	No. of fishing boat	Quantity of fish	Type and size of fish	Water quality of sea	Water quality is suitable for swimming?
An Thoi						
Duong Dong						
Ganh Dau						
Bai Thom						
Ham Ninh						

Perception of household sanitation system

5. What is the main type of toilet in your house?

Pour flush toilet ☐

Flush toilet ☐

Shared toilet/use neighbor's toilet ☐

Overhung toilet ☐

"Wrap and throw" method ☐

Public toilet ☐

Open pit ☐

Others: .....(please specify)

6. Do you have any on-site treatment units? YES ☐ (Go to Q.7) NO ☐ (Go to Q.13)

7. Please stick which one is best description for your on-site treatment?

Pit Latrine ☐

VIP latrine ☐

Septic tank ☐

Others: .....(please specify)

8. Does your toilet and on-site treatment unit work properly? YES ☐ NO ☐

9. Is kitchen water discharge into a septic tank? YES ☐ NO ☐

10. Is bath water discharged into a septic tank? YES ☐ NO ☐

11. Where is your house's wastewater discharged into?

Directly to the local drainage ☐

Directly to the ground, river or beach near house ☐

To the road side canal through small ditches ☐

Others:..... .....(please specify)

12. Overall, how are you satisfied with your toilet and on-site treatment units?

Not satisfied at all ☐ Satisfied ☐ Very satisfied ☐

13. I would like you to think about the following list of environmental problems that Phu Quoc island. Which one you think the most important? Please give your priority from the most important (5) to the least important (1).

Water pollution in rivers, beaches and fishing port

Solid waste collection and treatment

Degradation of marine life: coral reef, seagrass, dugongs.....

Degradation of forest and wildlife animals

Others: .....(please specify)

Part II: WILLING TO PAY (WTP)

Tourists favor Phu Quoc because of its biodiversity and peaceful environment. However, burgeoning tourism has caused amount of uncollected waste and thus threatened to wildlife habitat, health of local residents. Due to no existing waste treatment, almost effluent's sources have been discharged directly into the sea, wastewater and solid waste in particular. To preserve the island's attraction, suppose the local

authority needs a regular financial capacity to build a complete wastewater treatment, hygiene landfill and enhance protection

a. Natural conservation

14. Would you be willing to pay for natural conservation in Phu Quoc?

The fees collected will be placed in a special account or trust fund with a Fund Manager and a Board of Trustees. Those will be selected from representatives of the local government, the private sector and the People's Committee. The trust fund shall be supervised by other stakeholders and audited by external auditors regularly.

YES ☐ (Go to Q.15) NO ☐ (Go to Q.17)

Phu Quoc National Park

Coral reef in Marine protected area

15. How much would you be willing to pay for natural conservation in Phu Quoc island?....

16. For program of natural conservation, how would you prefer to pay?

Environmental tax per year ☐

Donation ☐

Other :..... (please specify)

17. Why would you not vote for a program of Natural conservation?

Can't afford it ☐

Satisfied with the current status ☐

That's the responsibility of the local authorities ☐

The information is not very clear ☐

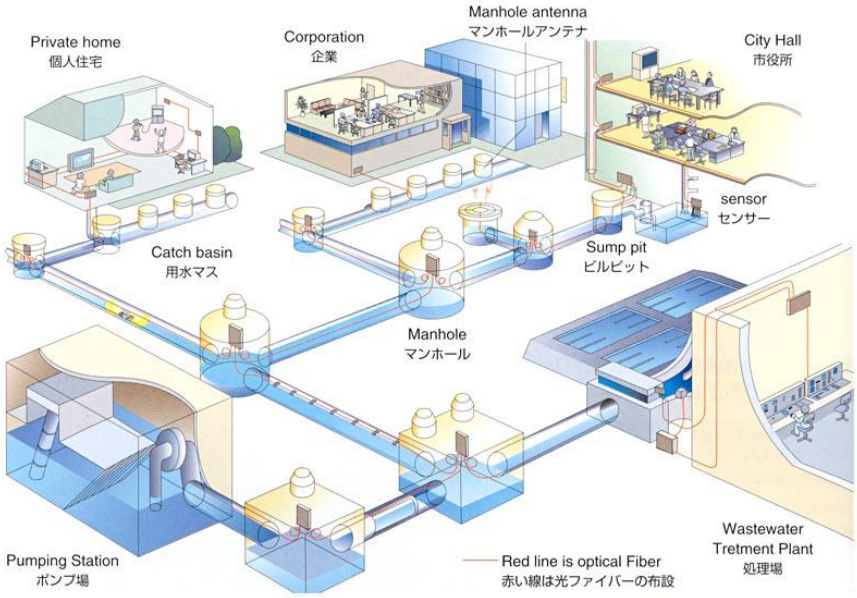
Do not believe that the money will actually be used to this purpose ☐

Other:.....(please specify

b. Drainage and wastewater treatment system

Drainage system design

Drainage and wastewater system design



18. Would you be willing to pay to improve sanitary and environmental conditions in Phu Quoc?

The fee would be collected and managed by local People's Committee. This fund will be monitored regularly under Governance Law and publicized for tourists, residents, etc.

YES ☐ (Go to Q.19) NO ☐ (Go to Q.21)

19. How much would you be willing to pay to improve sanitary and environmental conditions in Phu Quoc island?.. .....

20. To improve sanitary and environmental condition at tourist site, how would you prefer to pay?

Paid as part of utility bill ☐

Environmental tax per month ☐

Donation at local authority ☐

Other:.....(please specify)

21. Why would you not vote to improve environmental conditions?

Can't afford it ☐

Satisfied with the current status ☐

That's the responsibility of the local authorities ☐

Do not believe that the money will actually be used for this purpose. ☐

The information is not very clear ☐

Other:.....(please specify)

c. Solid waste collection and treatment

Building more public toilets

Collecting and treating waste at beaches

Landfill

22. Would you be willing to pay to improve sanitary and environmental conditions in Phu Quoc?

The fee would be collected and managed by local People's Committee. This fund will be monitored regularly under Governance Law and publicized for tourists, residents, etc.

YES ☐ (Go to Q.23) NO ☐ (Go to Q.25)

23. How much would you be willing to pay to improve sanitary and environmental conditions in Phu Quoc island?... .....

24. To improve sanitary and environmental conditions at tourist site, how would you prefer to pay?

Paid as part of utility bill ☐

Environmental tax per month ☐

Donation at local authority ☐

Other:.....(please specify)

25. Why would you not vote to improve environmental conditions?

Can't afford it ☐

Satisfied with the current status ☐

That's the responsibility of the local authorities ☐

Do not believe that the money will actually be used for this purpose. ☐

The information is not very clear ☐

Other:.....(please specify)

Part III: Respondent's information

26. How old are you? .....

27. Gender : Male ☐ Female ☐

28. Marital status: Single ☐ Married ☐ Divorced ☐ Windowed ☐

29. Education:

Elementary ☐

High school ☐

Undergraduate ☐

Post graduate ☐

30. What is your current occupation? .....

31. Which category best describes your total household or family monthly income?

Less than 1 million ☐

1 - 3 million ☐

3 - 6 million ☐

6 - 9 million ☐

9 - 12 million ☐

Over 12 million ☐

32. Do you have other assets? No ☐ Land ☐ House ☐ Fishing boat ☐ Other ☐

THANK YOU VERY MUCH!